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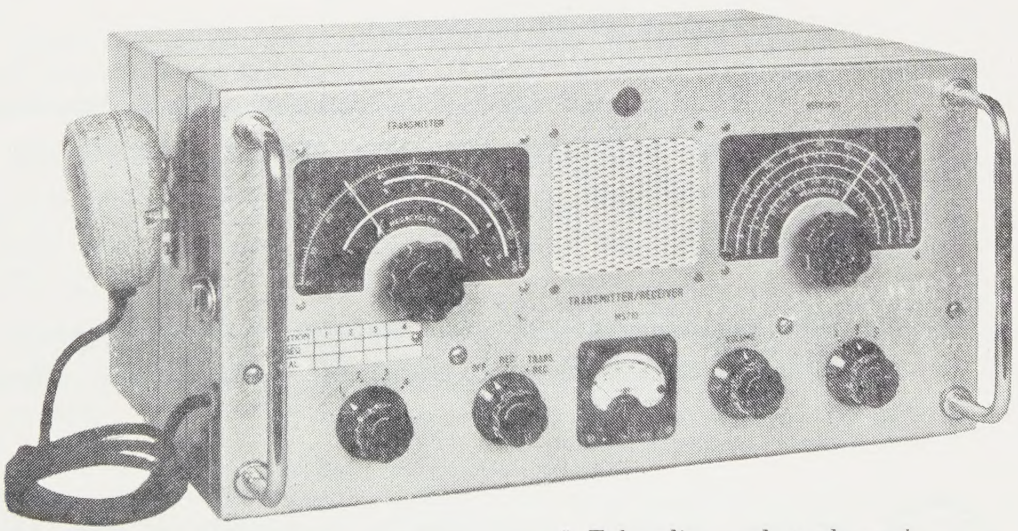

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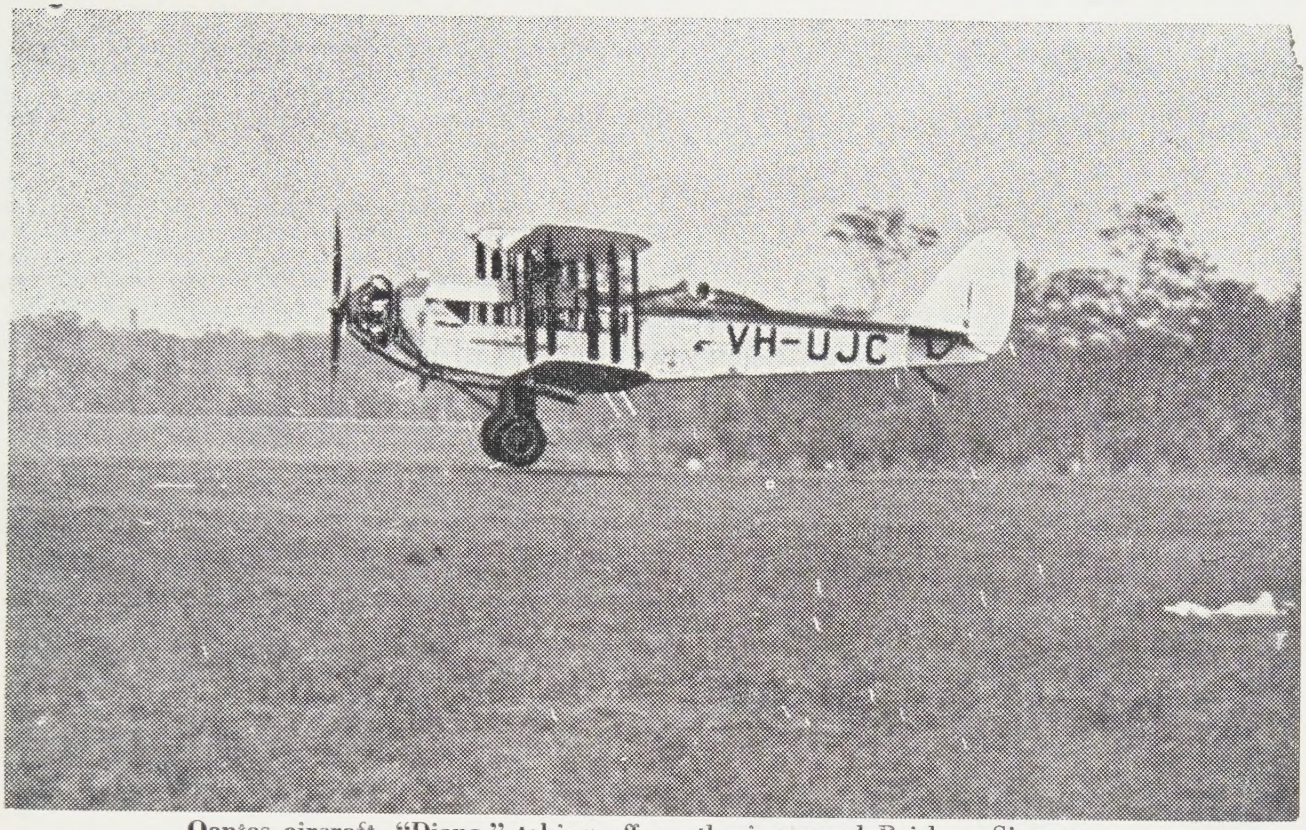

Qantas aircraft, "Diana," taking off on the inaugural Brisbane-Singapore service, December, 1934.

Hotel meeting launched an air service

In the winter of 1920, four men met in the Gresham Hotel, Brisbane, Q., to discuss the formation of an air service now known all over the world as Qantas Empire Airways.

Two of the men, Hudson Fysh (later Knighted) and P. J. McGinness, were Air Flying Corps pilots in the first World War. Both earned the Distinguished Flying Cross. The others were Western Queensland pastoralists — Sir Fergus McMaster and A. H. Templeton.

This was in the "barnstorming" era of Australian aviation when flying-men were risking their necks stunt-flying all over the Commonwealth in old aeroplanes from war-disposals stock.

Men of vision, such as Hudson Fysh and his companions, could see a future in the development of air services to benefit the people of the outback rather than provide entertainment. As a result of their meeting at the Gresham, Queensland Northern Territory Aerial Services Ltd. (Qantas) came into being.

Joy-Riding at First. Money was short, and in the beginning the organisation was forced to provide joy-riding flights — £3.3.0 for 7 minutes in the air, and £5.5.0 for looping the loop.

By 1922, Qantas was operating a service between the rail-head towns of Charleville and Cloncurry. Today it operates over 26 countries totalling 68,000 miles.

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The South Pacific Commission

The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of Island Territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to recommend to the member Governments means of promoting the well-being of the people of these territories. It is concerned with social, economic and health matters. Its headquarters are at Noumea, New Caledonia.

The Commission consists of twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

The Research Council assembles once a year. Members are appointed by the Commission, and are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Suva in April, 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April, 1953. The third Conference will be held in Suva in April, 1956.

The Commission's secretariat includes six principal officers, as follows: Secretary-General, Dr. Ralph Clairon Bedell; Deputy Secretary-General, Mr. John Ryan; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon. The posts of Deputy Chairman of the Research Council and Executive Officer for Social Development are vacant temporarily.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

NOTE: A map on which the Commission area is delineated appears on the inside back cover.

FRONT COVER PHOTOGRAPH

A nurse of the Netherlands New Guinea medical service proudly displays a well-nourished infant. The Administration attaches special importance to maternal and infant welfare, and a special branch of the Public Health Department to combat infant mortality has been established under the supervision of a certificated nurse, with a woman doctor as adviser.

Courses of instruction for trainee nurses from villages are given in simple midwifery, infant care, infant nutrition, village hygiene, first aid, and in recognition and treatment of diseases such as malaria, pneumonia and dysentery.

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THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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THE COMMISSION does not accept responsibility for statements made in contributed articles.

Above: A demonstration of the correct preparation of infant foods. Upolu, Western Samoa. The mothers know all the routines, but may not practise them daily at home. Right: Mothers are quite well fed, infants sometimes not. Upolu.

Maternal And Infant Diets In The South Pacific

The vital importance to infant health of ensuring adequate pre- and post-natal nutrition of island mothers is stressed in this article.

By H. A. P. C. OOMEN*

SOME time ago a medical-nutritionist and a dietitian visited a certain Pacific island. After their survey they were asked to give a lecture to the island authorities. It was a solemn assembly. Part of the big green table was occupied by Government officials and by deputies of agricultural or fisheries agencies. A smaller part was reserved for nurses and mothers' committees. These latter were older women. Life had grooved their faces and somewhat greyed their hair. But they were full of experience and of desire to pick up a useful grain. Their clothes were simple but spotlessly clean. They looked over-serious, and were perhaps a little awed by the official atmosphere.

The lectures were heard with ingratiating attention. It is not often that the gods of the Olympus descend on small islands! Afterwards opportunity was given to ask questions. A number of more or less sensible questions were asked. Finally the gentleman from agriculture, a rather imposing and prosperous-looking young man, persuaded himself that he had to put in a question too. He stated that he considered generally the young girls of the island as rather well fed and attractive. "But then," he said, "they marry and have two or three children and they are rapidly looking like young grandmothers. Could this also have something to do with nutrition?"

The dietitian answered: "It has struck me in the whole of South East Asia that, at the table, the husband always has the first choice and takes the nicest bits. Then come the children and finally the mother. Perhaps this could be the explanation of the premature wilting of the well-looking girls?" At which the chief women of the committee roared with laughter.

The listeners had received a very good practical lesson in nutrition—that the condition of the body of the mother is very important, and that not only to herself but to the community. It is in the body of the mother, out of the mother's food, that the newborn child is built up. And much harm might already be done to the future development of the child, even before it is born. Rather recently, gynaecologists from Canada, a country with one of the best popular diets of the world, have shown that a considerable number of abortions, of still-births, of low birth-weights could be prevented by certain simple nourishing additions to the diet of the pregnant woman. It is not necessary to mention them; there is nothing magical in the precept, but very good care was taken that the mothers really consumed the foodstuffs.

Now in the Pacific, at least in Melanesia, birth-weights are often low. It might be that racial differences are responsible, but the probability that prebirth nutrition is the cause is certainly worth consideration and study.

Owing to the unabated endeavours of Sheila Malcolm[1] we know that the pattern of development of the infant in all parts of the Pacific during the first half year of life is satisfactory, and sometimes better than elsewhere. He is then living on breast-milk, the body grows and differentiates at a rapid rate, but the infant is still small and his nutritional requirements limited. It is again the nutritional

* Medical Nutritionist, South Pacific Commission.

[1] Miss Malcolm is Nutritionist to the South Pacific Commission.

state of the mother, and the food she eats, which is mostly accountable for that growth. Breast-milk is an ideal food for human beings, the best we know. So at least this part of life span of the child seems to be safe.

But difficulties arise as soon as the growing body of the child exacts more and different food than can be provided for by the mother's breasts. Additional food is usually introduced too late, and it is of too poor a quality.

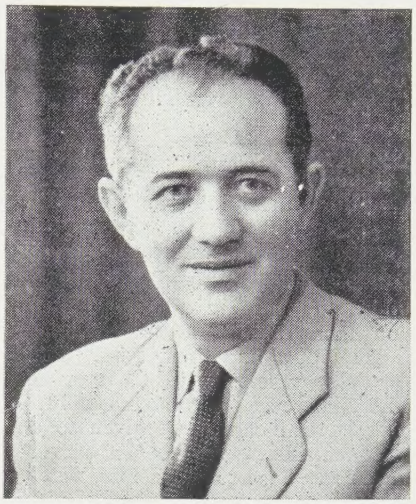
If cow-milk is available, either fresh or tinned, these difficulties can be overcome easily. The beautiful, undisturbed development of white children in Europe, North America, Australia, New Zealand can prove this point.

But the Pacific infant finds itself often in a more dangerous situation. His first foods are sago, banana, rice, taro, sweet potato; all these foodstuffs contain too much starch and too little protein and other essential nutrients. For a certain

FOOD AND NUTRITION

Work Programme Of The South Pacific Commission

By EMILE MASSAL



Dr. Emile Massal, Executive Officer for Health to the South Pacific Commission.

THE readers of the QUARTERLY BULLETIN *will find in this issue several articles devoted to the diet and nutrition of South Pacific peoples. A general introduction is justified by the close inter-dependency of the various problems examined.*

All those whose activities are directed towards promoting the welfare of the island peoples are surely aware of the reality and importance of dietetic and nutritional problems. Adequate and balanced feeding for all sections of the community is an essential basis to this well-being. Apart from the daily satisfactions it provides, it also ensures a proper nutritional status, an essential factor in leading a full and productive existence.

These many problems have not escaped the expert attention of the Research Council, a technical body whose task it is to advise the South Pacific Commission. For long past, the Council has been aware of the need for a better definition of these problems and the necessity for discovering solutions which will facilitate the work of territorial governments and administrations.

The peoples themselves were able, through their representatives to the Second South Pacific Conference held at Nouméa in April 1953 to give direct expression to their opinions and to formulate some valuable recommendations.

The Commission has recognized the vital importance of proper feeding for the islanders of the South Pacific, and has accorded high priority to the studies and research contemplated in this field. Year after year it has devoted vast sums to the project. It has been successful in engaging the services of research scientists of merit whose efforts are a guarantee of past and future results.

The programme is a wide one. It includes at present the evaluation of the nutritional status of the populations; surveys on diets, and on methods of production and distribution of food stuffs; chemical analysis of foods; research into the best methods for preservation and storage of local and imported food products; education of the peoples in nutrition.

The research involved absorbs the full-time activities of a physician-nutritionist, a dietitian, a food technologist, two biochemists, one laboratory assistant, one stenographer. The work of the Commission experts under the research projects on subsistence economies, fisheries and audio-visual aids is also related, to a varying extent, to that of the personnel engaged on the programme in diet and nutrition.

Under the general authority of the Secretary-General, the Executive Officer for Health is responsible for supervising the research, maintaining necessary liaisons and attempting to enrol the co-operation of the territories and other organizations and institutions.

For many years now the nutritionists of the South Pacific Health Service, Suva, Fiji, have been examining the problems set by diet and nutrition of island peoples. Their many scientific and educational publications are an indication of the scope of the work undertaken and untiringly continued.

With his habitual goodwill and unfailing desire to co-operate, the Director of the French Institute of Oceania made part of his chemistry laboratory available to the Commission.

While awaiting complete installation of the food analysis laboratory in Nouméa, the Australian Institute of Anatomy, Canberra, provided accommodation for the Commission biochemist and supervised his work for many months. During a profitable world tour in 1953 the biochemist also benefited from the friendly advice of eminent specialists in food analysis.

The value of chemical analysis of South Pacific foods, and more especially of the vitamin assays, attracted the attention of the Williams Waterman Fund, Research Corporation, New York. A generous contribution from this Fund enabled the Commission to acquire both personnel and equipment for original research.

Finally, the Food and Agriculture Organization of the United Nations has assigned a dietitian to the Commission for 1956. Thus, Miss Sheila Malcolm, well known for her research on feeding and nutrition of young children in the Pacific, will be enabled to continue her work.

The results of Commission research have been circulated in a number of publications. Others will follow, for the Commission is continuing its efforts.

Commission and South Pacific Health Service specialists have kindly contributed to this issue, willingly accepting this added burden to their daily task. In the articles they have prepared they describe the problems they have discovered, defined and studied. They also present their results, and inform us of their plans for the future as well as their determination to bring the research undertaken to a successful conclusion. I am anxious to express my sincere gratitude to them all.

Their work, with which I am familiar and which I hold in great esteem, has produced important results. Their interpretation, in terms of promotion of the well-being of the peoples, remains the responsibility of territorial governments and administrations. This is in accordance with the wishes of those who in 1947 established the South Pacific Commission. In this difficult task may they rest assured of our entire co-operation.

Saiho Infant Welfare Centre in the northern district of Papua. Sister E. M. Gilbert chatting to a group of mothers who have brought their babies for periodical check and treatment.

period the diminishing breast-milk output still can compensate for the incipient deficiencies. But the growth of the child slows down. In a critical period of its life, its tissues are not developing and differentiating along the desirable pattern. The worst-fed infants of the community develop malnutrition; or they become victims of disease of which they might die because they are malnourished. The wick of their life is burning slowly, and it may go out.

Thus it is very essential that additional food should be introduced at the right time, and that it should be the right kind. Until these points are hammered into the heads of all Pacific mothers, not much improvement can be expected.

Though they are in a more difficult position than their Caucasian counterparts, they must find their ways. Cow-milk is very wholesome, but it is not essential. There is no good reason why soft cooked fish cannot be given to an infant of six months. If no fish is available, even shrimps or soft shellfish would do. Then it is deplorable that legumes and pulses are so unpopular in the region. Peas, beans, even peanuts (cooked, fresh) would also present an excellent substitute, because they are rich in protein and other important nutrients. The virtues of fruits like tomatoes, papaya (ripe) and oranges; and of vegetables like spinach (*Amaranthus*), 'kangkung' (*Ipomea,* a water plant), 'melindjo' (*Gnetum,* a tree) and young ferns, are often unknown or neglected.

Nor is everything said about the infant's diet with enumerating the valuable foodstuffs which it should and could contain. A child's food needs a certain amount of individual preparation. The specific nutritional requirements of the small child not only ask for different composition as to nutrients but also for the right consistency, or perhaps even colour, of the food. A rather solid piece of taro or tapioca in the small unreliable fingers is as objectionable as a dummy in the mouth of the infant. This means availability of adequate cooking facilities and adequate utensils. It is rather paradoxical to find radios in the schools and watches on the fathers' wrists, and even foreign languages on the mothers' tongues, without finding a proper bowl or spoon in the home for use by the infant. Thinking about obsolescent older customs, it is quite clear that the stone oven, however acceptable its products to adults' tastes and habits, is quite unsuitable for the infant's diet.

It might seem to some people that the household problems mentioned here are not sufficiently profound or scientific to fascinate the imagination. Nevertheless, they are deadly serious and at the very base of human welfare.

Fortunately, in the Pacific generally, conditions are not so shocking as in certain surroundings of South East Asia, which caused Florence Nightingale to speak of "the massacre of the innocents", now a century ago. Still, infant mortality is often disturbingly high, and the question as to whether the child died of disease, of malnutrition or of the combination of both is sometimes very difficult to answer.

But mortality figures are a poor indication of the havoc caused. Little fantasy is needed to realise the importance of growth retardation, bodily and mentally, of the consequences of a poor start in life, for the infant; of the chronic unvitality of the mother and unhappiness of the family caused by poor nutrition; of the social burden of too prolonged breast-feeding, encroaching on the personal life of the mother.

Mother The Central Figure

One point should be clear. It is always the mother who is in the centre of the problem. She collects, chooses and prepares the food for the family; her body is responsible for the nutrition of the unborn foetus and of the breast-fed infant. She is answerable for the diet during the weaning period, wholly responsible for the upbringing of the child till it is delivered to the school teacher. She has to pay for the lack of knowledge or of care, either in her own body or in her child or her family.

So, as far as education can do something to improve nutrition, it is the mother who should be the centre of interest. She could be prepared for her responsibilities while at school, but she is very young and unresponsive. Still, S. Holmes recommended simple courses in child care for Samoan girls of six to twelve years old—and with good reasons, because in practice they were mostly in charge of the feeding of their infant brethren! Courses in home economics, later on, appear already more valuable. But the most sensitive period does not come before the woman is confronted with the real problems of her married status. First pregnancy, first delivery and first lactation period present ideal opportunities for successful indoctrination.

Much depends on the amount of attention caught and on the personality of her guide. There is a difference between training and education, between the recipe in the cook book and the actual consumption of the food. Training courses might be attended to with industry, with neat and copious annotations but still not be put into practice when the occasion arises.

A daily guide is needed, an expert in the situation, a trusted person. Examples are better than precepts. Solicitude would be the best stimulus, but admiration, curiosity, comparison with other infants, or even adulation of the nurse and envy of her colleagues might serve the purpose. It is not training courses, nor posters, nor filmstrips which are most important, but the personality of the guide. If and where suitable personalities are found, they should receive every possible help from official agencies. Women's committees, maternal and child welfare centres and baby clinics would provide the surroundings to employ such personalities. This is a problem of human relations and not just the delivery on demand of stamps across a counter or

putting the right machine to work by turning a knob.

But who is going to teach the teachers? The local doctor? It is essential, of course, that he be interested, but he rarely will find time and opportunity for such long-term extensive activities. The nurse, especially the local district nurse or midwife, would be in a better position. She is to be briefed beforehand in an expert and practical way. What counts ultimately is how the food is going to be converted in human tissues. Which food? How prepared? Suitable for the surroundings? Available? Expensive? Which persons? Which places? Policy of introduction?

The difficulty with nutrition is that it is finding itself always between two stools. Everybody agrees that it is important, that it is the most basic condition of life. The physician discovers the effects in his patients and might suspect them in others. The public health officer and the administrator are interested in it as an important part of human welfare, but they have many other pre-occupations. The agriculture, animal husbandry and fisheries' officers are occupied with the production aspects. The economist has to decide about ultimate possibilities only. The church is praying: "Give us this day our daily bread." But there is no definite expert in all these agencies who is peeking his nose in kitchens and cooking pots; who is able to tell exactly how some specified people should improve their actual diets, how possibilities can be made to meet requirements.

Above: Measuring and weighing of infants is a necessary procedure—though one that is not always appreciated. Samoa.

Above right: A bowl and spoon are among the first articles needed for child care. As a makeshift bowl, a clean coconut shell will do.

Right: A young lady of Samoa poses with a popular Pacific food—the coconut. It is an excellent food, but should be used with some reservations.

This is not quite true. There have been, thank God, in recent years, a few experts working constantly on these problems with the South Pacific Health Service at Suva and with the South Pacific Commission at Nouméa. They are the dietitian-nutritionists who did so much to increase our knowledge on the composition of Pacific diets and of its effects on the population. But one or two stars in heaven are not enough to illuminate the earth. What is needed are local, well-trained nutrition experts, if possible native, who on the one side could co-operate with governments, public health and subsistence authorities; on the other, with the district nurses and

(Continued on page 56)

Coconut palms in a Fijian village.

Pacific Subsistence Crops . . .

THE COCONUT

The ninth of a series of articles on subsistence food plants in the South Pacific

By EMILE MASSAL and JACQUES BARRAU

Executive Officer for Health | Subsistence Agriculture Officer
South Pacific Commission

SPECIALISTS are far from agreeing on the geographic origin of the coconut, *Cocos nucifera,* L. or on the route it travelled on its way to the Pacific islands. Some botanists believe it originated in tropical America, while others—in fact the majority—consider that the tropical areas of the Old World, and more particularly the shores of the Indian Ocean, were its first home.

Nor is the controversy limited to this point. Botanists and ethno-botanists are also at variance on the question of whether coconuts drifting at random with the currents can retain their germinative powers long enough to create spontaneous groves on the shores where they finally come to rest. "Yes", say some, backing their assertions with experimental findings. "No", answer others, in the light of negative trials. It is not our intention to engage in these discussions.

The distribution and introduction of the coconut in the Pacific islands seem, however, to have been effected by man rather than by the elements. The Polynesians have apparently contributed largely to this expansion. The name they gave to the coconut tree, "niu", with its many variations, is still the most commonly used in the region. In New Caledonia, where some forty different languages and dialects have been recorded, the Polynesian name is in general use. It seems that the coconut was introduced into this island by Polynesians coming from the East in the sixteenth or seventeenth century. When the island was first discovered by Europeans, the coconut was present only at a few points on its north-east coast.

Whatever may have been its origin, the coconut is nowadays one of the classic features of the coastal flora of South Pacific islands. Its importance is considerable from both the subsistence and general economy point of view.

We shall not dwell here on the economic importance of this tree. The dried meat of the ripe nut, or copra, was first produced for export in the course of the last century, and has since become an essential element in the economy of the area.

Only the food uses of the coconut will be considered. Human life on atolls would be scarcely possible without it; in fact, the nut is a staple food for all atoll dwellers. On other islands it is quite often the main supplementary food.

In addition to the meat at the various stages of maturity, the islanders use in their diet the water contained in the young nut; the terminal bud of the tree; the sweet husk of some varieties—"ha'ari-maaro" in Tahiti—grouped by Miguel under the botanical variety *saccharina;* the coconut apple—"uto" in Tahiti—a spongy mass with which the nut is filled during the germination period; the very young shoot. In Micronesia, the sweet sap (or "toddy") which flows from a cut made at the tip of the inflorescence before the spathe opens, is also harvested.

The meat or, to be more exact, the albumen which covers the inner wall of the coconut, is eaten by South Pacific islanders at various of the successive stages in its development. It is prepared in different ways.

In the early stages, when the albumen is no more than a thin gelatinous layer, it is sometimes used, especially on the atolls, for infant feeding. At a later stage, while the nut is still green, the albumen provides the most common "in-between snack" of the natives. This substance is also used in the preparation of fermented condiments such as the Samoans "sami lolo" and the Tahitian "miti hue".

To prepare "sami lolo", the nut is pierced, the water emptied and replaced with sea water. The hole is then plugged with straw and the nut left in this state for one or two weeks. It is then shaken and a thick condiment of slightly decayed albumen and sea water is obtained. The odour is somewhat "surprising" to the Europeans. Cooked with young taro leaves, this sauce produces a very tasty dish. It is also used uncooked as a seasoning for starchy foods: taro, breadfruit, yam, bananas.

The preparation of "miti hue" is

slightly different. The albumen of a green nut in the "omoto" stage is cut into thin slices and placed in a gourd or bottle, together with sea water and the crushed head of a fresh-water prawn. Fermentation is accelerated by leaving the gourd in the sun for a few hours each day. The gourd is shaken from time to time and the condiment is ready for use when the mixture has become thick and slightly creamy. Sea water is added to replace the amount of condiment used, and this continues until there is no albumen left. "Miti hue" is used in the same way as "sami lolo".

A sort of porridge, called "vaisalo" in Samoa, is prepared from the fresh albumen of green nuts, mixed with water from a young coconut and starch from *Tacca leonpetaloides* (the Polynesian arrowroot).

The albumen of the mature nut is eaten either as it is, or, more often, grated; alternatively, the grated meat may be moistened with water and pressed to extract the "cream"—commonly known as coconut milk.

Coconut cream is widely used as a condiment by Polynesians. It is poured over most foods after cooking and is also mixed with starches and edible leaves before cooking. Wrapped in leaves and baked in the oven, the coconut cream coagulates and provides a very palatable kind of custard. It replaces cow's milk in coffee. Sea water is often added to coconut cream and the mixture flavoured with lemon juice and chili. In most Polynesian islands and in those islands of Melanesia where Polynesians were early settlers, coconut cream is sometimes condensed by immersion of hot stones.

Finely grated and fermented by adding the crushed head of a freshwater prawn, the albumen of the mature nut is used by the Tahitians to make their "taioro". This is a sort of creamy paste, slightly sour in taste, which constitutes the usual side-dish with a number of foods and with some marine shell-fish, particularly "maoa" and "ouao".

Left: The coconut "apple" (or "ulo" in Polynesian) which develops inside the nut during germination. Rarotonga, Cook Islands. Right: Young coconut seedling. Inside the germinating nut may be seen the coconut's "apple", which at this more advanced stage is not very palatable. Tuamotu Islands.

Collecting the coconut sap, or "toddy". Ebon Atoll, Marshall Islands.

Chemical Composition of Albumen

The chemical composition of the albumen of the coconut at various stages of maturity and that of the products derived from it has formed the subject of extensive research and a considerable number of publications. Mr. F. E. Peters, South Pacific Commission biochemist, has compiled and published (SPC Technical Paper No. 58, April, 1954) an *Annotated Bibliography of the Nutritional Aspects of the Coconut*. With the help of this paper and a number of food composition tables, the following table has been prepared, indicating the proportions of the main nutritive elements per 100 g. of edible portion.

	ALBUMEN			COCONUT CREAM	
	(1)	(2)	(3)	(4)	
Calories	72	230	350	439	
Moisture, g.	86	76	48	14	52
Proteins, g.	1.3	1.9	3.8	5.7	4
Fats, g.	5.4	10.5	34	50	27
Carbo-hydrates, total g.	4	6	13	28	19
fibre, g.	2.4	3.8	3.2		
Ash, g.	1	1	1	1.7	1
Calcium, mg			21	24	10
Phosphorus, mg.			98	170	150
Iron, mg.			2		
Thiamin, mg.			0.11		
Riboflavin, mg.			0.01		
Nicotinamin, mg.			0.2		
Ascorbic acid, mg.		3	3		
Tocopherol, mg.			0.2		

(1) Very young nuts with gelatinous albumen; (2) green nuts with thick hard albumen; (3) mature nuts; (4) dried albumen from mature nuts

As the nut matures and the albumen develops, the moisture content of the latter gradually decreases, while the fat content rises noticeably; the protein and carbo-hydrate contents also increase, but comparatively less than the fat content.

The mature albumen is a poor source of calcium, but a good source of phosphorus and iron. It contains practically no fat-soluble vitamins (A. and D), little thiamin (vitamin B_1), riboflavin (vitamin B_2) and ascorbic acid (vitamin C). On the other hand, nicotinic acid (vitamin PP) is present in rather large quantities. The tocopherol content (Vitamin E) has been recorded at 0.2 mg. per cent.

The results obtained from a number of growth studies on the rat—an animal whose metabolism in many respects closely resembles that of man—are sometimes at variance as far as the biological value of coconut meat proteins is concerned, being rated high by some and low by others. It should be noted, however, that almost all the tests dealt with mature nuts from which the oil had been extracted by the usual methods.

Copra cakes of this type contain, in addition to a certain proportion of oil, approximately 28 per cent. of carbohydrates and 25 per cent. of proteins. They are chiefly used for animal feeding. The extraction of fats by organic solvents would make it possible to obtain, on the one hand, an excellent grade of oil with good keeping qualities and, on the other, a mixture of proteins, carbohydrates and mineral salts acceptable for human consumption. The research carried out along these lines in

Making coconut cream in a Samoan village.

the Philippines appears to require further development.

Coconut oil is recognized by most authors as being easily digestible, more so than olive oil, "ghee", lard, etc. It would appear to be absorbed more slowly. It is not generally popular as a cooking oil, owing to the pronounced coconut flavour which it often retains. However, edible fat preparations with a coconut oil base have a wide public. It seems that processing methods play an essential part in determining the quality of the commercial product.

Severe cases of poisoning have been reported following the consumption of copra press-cake, chiefly in Indonesia. The cause of these was infection of the copra by *Bacterium cocovenenans*, which secretes a toxin that is particularly harmful to the central nervous system.

The present importance of the coconut in the subsistence economies of the area should not be under-estimated. Admittedly, the number of coconuts eaten per head per day varies considerably from one locality to another. It seems to be highest on the atolls, where daily consumption of 5 to 6 nuts per person has been recorded. In other places a few nuts only are used for cooking and drinking. Let us mention as an example the estimates noted in 1935 by one of the present authors in an island of the Tuamotu Group. The potential copra production of the coconut grove was assessed at 90 tons per year. The actual copra production was 30 tons. We were told that the rest was shared equally by the islanders and the rats.

The albumen in the nut is not—as we have stated—the only part of the coconut palm which is used for food purposes.

Apart from the sweet husk of some varieties, the heart of the palm—the terminal bud whose removal means death to the tree—is very popular, especially with Europeans, who eat it in salad form. It has been jokingly called "millionaire's salad", thus emphasising its rather luxurious nature.

The "coconut apple" is of great importance in the subsistence economy of certain atolls. This is the name given to the absorption organ of spongy consistency which develops during the germination period at the expense of the water and albumen in the nut. On a number of atolls, this "apple" is the main—sometimes the only—"fresh vegetable". In the northern group of the Cook islands the islanders organise whole "nurseries" of palms which they visit daily to gather the "apples" required for consumption. On occasion, germination is accelerated by burying the nuts. The ultimate refinement in techniques aimed at obtaining "uto"—Polynesian name of the "coconut apple"—consists of preventing growth by repeatedly breaking off the young shoot. As a result, reserves of albumen collect in the absorption organ, which becomes firm enough in consistency to be grated.

"Uto" are eaten raw, cooked in the unopened nut, or sometimes in the form of a paste or mash obtained by mixing them with grated albumen and coconut cream.

The coconut palm can also be classed as a sugar-plant, at any rate in Micronesian atolls. The sweet sap, or "toddy", is obtained by cutting the very young inflorescence before the spathe opens. This is previously shaped into a cylindrical form by binding with a rope made from plaited coconut fibres. The cut, made at the distal tip, is renewed each day. The sap drips into a receptable—a coconut shell or bottle—hung on the end of the spathe. The yield is approximately 2 pints per 24 hours.

"Toddy" contains 16 per cent. sugars. It can be drunk fresh, diluted with water, or can be condensed in a basin over a slow fire, thus producing a kind of molasses, known as "Kamaimai" in the Gilbert Islands. This is utilized in a number of culinary preparations. When left to stand, "toddy" ferments rapidly; within about 15 hours it produces 6 per cent. alcohol. The raising agents responsible for fermentation are rich in group B vitamins; their content is equal to about one-third of that of the yeast obtained from beer.

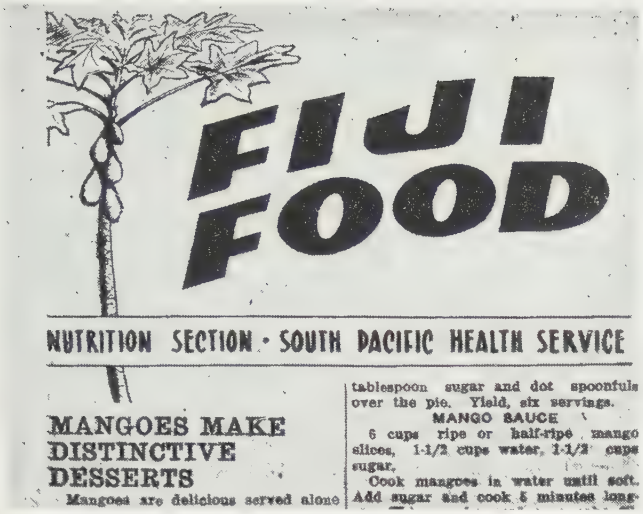
A Gift of Providence

For the stranger to the region, the South Seas conjure up scenes of limpid, blue waters and beaches of white sand shaded with coconut palms. For him, the coconut palm is a symbol of the easy life of the "islands". This myth, established by literature and art, hardly corresponds to reality.

In fact, as has often been said, the coconut is a gift of providence to the Pacific islander. It supplies him with shelter, food and income; not, however, without effort on his part.

On the atolls, where ecological conditions prevent the growing of more than a few subsistence plants, the coconut has provided the islanders with essential staple foods, and still continues to play this role today. The income derived from copra production, despite wide fluctuations, makes it possible to purchase extra foodstuffs and other essential—or superfluous—requirements.

On the high islands the coconut is the main cash crop. But there, in view of the greater variety of food resources, coconut products are relegated to the level of supplementary foods. This is the opinion of both nutritionist and dietician. However, it is as essential to the inhabitants of the high islands as the atoll dweller. Traditions, which remain firm, and the attraction of the delicious dishes the coconut provides, keep this need alive.


FIJI FOOD

NUTRITION SECTION · SOUTH PACIFIC HEALTH SERVICE

MANGOES MAKE DISTINCTIVE DESSERTS

Mangoes are delicious served alone

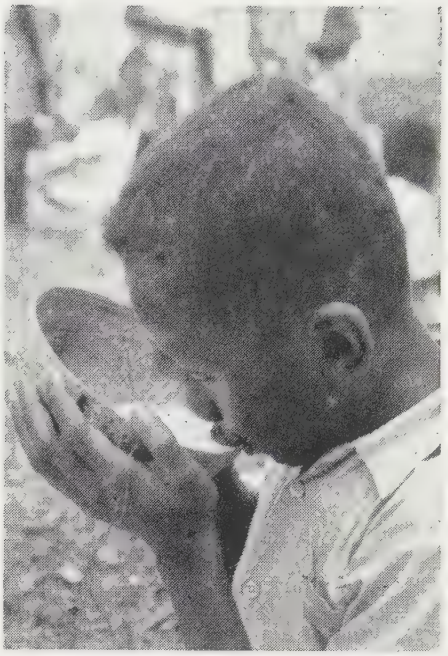
tablespoon sugar and dot spoonfuls over the pie. Yield, six servings.

MANGO SAUCE

6 cups ripe or half-ripe mango slices, 1-1/2 cups water, 1-1/2 cups sugar.

Cook mangoes in water until soft. Add sugar and cook 5 minutes long

Left: Food notes in the local press help people make the best use of seasonal foods. Right: Coconut cups make good drinking containers.



Public Health Nutrition Programmes In The Pacific Islands

By SUSAN HOLMES*

The South Pacific Health Service provides an advisory nutrition service to Western Samoa, Tokelau Islands, Kingdom of Tonga, Cook Islands, Niue Islands, Gilbert and Ellice Islands Colony, British Solomon Islands Protectorate, and the Colony of Fiji. For this vast area the nutrition section has planned a programme designed to improve the standard of feeding of its inhabitants.

PUBLIC health nutritionists coming to the Pacific for the first time are soon aware that there is plenty of scope for developing the same type of programmes that exist in Europe and America. The schools, teachers' training colleges, nursing and medical schools and many other training courses provide ideal focal points for nutrition education. In addition, there are opportunities for working with social clubs and other organizations interested in welfare. The infant and maternal clinics in villages, rural dispensaries and out-patients' departments also provide excellent places for teaching nutrition to interested groups of women.

In most territories, the supplies of both imported and locally-produced foods are controlled to a fairly large extent by government trade schemes or a few large firms, and by the Agricultural Department. In these organizations there are ample opportunities for the nutritionist to give advice on the better types of processed foods, and on the requirements and disposal of useful crops.

Throughout the islands, hundreds of young people spend several years of their student life living in institutions. Here the nutritionist can advise on ways and means of improving nutrition, and on developing good food habits for future life.

Before embarking on a scheme to improve nutrition, it is necessary to have a comprehensive knowledge of the conditions in the area. This can only be acquired by working among different sections of the population living in the various islands. Up till now it has not been possible for our limited staff of one or two nutritionists to investigate wide areas of each territory, but during the last five years we have managed to carry out preliminary surveys among fairly typical groups of village and semi-urban populations in Western Samoa, the Cook Islands, Niue, the Kingdom of Tonga, the Gilbert Islands, the British Solomon Islands Protectorate and Fiji.

In these surveys we have collected data concerning heights, weights and general nutritional status; family meals, local foods, recipes and customs regarding food.

It has been found necessary to vary our survey methods to fit in with the way of life in the different areas. Among the Polynesian people it is extremely difficult to obtain a true idea of individual consumption because families go to great lengths to conceal any food shortage. We have found it best to keep daily records of the total amount of food coming into the house, and the dishes cooked at meal times. This information is then checked by visiting the family gardens, by discussing fishing and other food gathering expeditions and by examining store accounts. Whenever possible, qualitative information is collected at the same time. Sometimes the school master arranges for the older classes to keep a list of the foods eaten every day for a week, or a larger sample of village households may be selected for daily questioning. For example, on the island of Miana in the Gilberts, five households agreed to having their meals weighed while twenty households described the foods eaten during the day.

The food patterns of Cook Islanders living in Rarotonga and Manihiki were studied during regular daily visits to households. Foods for the main meal were weighed and records kept of the number of loaves of bread and other store foods consumed during the week. At Manihiki the school teacher kept a record of the children's meals for a week.

Tongan households were pleased to

* Senior Nutritionist, South Pacific Health Service.

Left: Nurses at the Central Nursing School, Suva, demonstrate how infant foods can be made with the coconut cups and strainers, and with wire strainers and enamel bowls. Right: Nurses at the School making pictures for flannelgraphs to illustrate their talks on infant feeding.

display ample food supplies. A true picture of family consumption was revealed by careful observation of gardens, fishing expeditions and store accounts.

An annual survey carried out over a period of three years in a Fijian village yielded excellent quantitative data. Here again, the school assisted by keeping daily records of the foods eaten by children.

In the British Solomon Islands Protectorate, nutrition research was combined with a tuberculosis and leprosy survey. Households were visited for three consecutive days, and during this period, the baskets of food brought into the house were weighed.

Surveys of the food consumption in urban groups in nearly all territories have yielded fairly accurate results. Diets of the poorer sections of these communities are based on cheaper carbohydrate foods, usually obtained once a week from the local store. A record of store accounts, weekend purchases at the market, and presents from visiting friends usually give a complete picture of an unsatisfactory state of nutrition.

Nutrition Work in the Community

During research work, some of the nutritional weaknesses in the community become obvious, and once the work is finished, time is spent advising, lecturing and demonstrating how these may be improved. Towards this end a course for nurses is given, and series of demonstrations are arranged for the women committees. In the institutions, cooks are trained to prepare better meals. Village recipes are adjusted for institutional use, and suitable menus and ration scales are devised for schools, prisons and hospitals.

The results of the survey, combined with practical experience gained during the visit to the territory, provide the basis for long-term plans to improve nutrition.

Research has shown that the main causes of malnutrition are poor selection and an unsatisfactory use of food. In all territories, we have found evidence to show that there are two nutritionally vulnerable points in the life of the Pacific Island child. These occur at weaning, and early school age.

THE INFANT: Changing customs in the feeding of infants, combined with often half understood teaching from medical workers, has confused many Pacific island mothers. In our education programmes we have tried to include some of the old customs in the teaching of infant nutrition. Every study of the village infant feeding methods reveals much that is good, and with a little imagination, the nutritionist adapts new suggestions to fit in with old and familiar practices. An example of this can be found in the preparation of fruit juice. In nearly all Pacific islands, the people use the fibre which hangs from the base of the coconut palm fronds to strain herb medicines. When properly cleaned, this provides an ideal material for squeezing the juice out of fruits and for straining soups for the young baby.

There are many occasions when nutrition teaching falls on stony grounds, simply because the women cannot visualize the method of preparing the recommended foods. In our surveys we make a special study of the traditional baby foods. We then show mothers how to prepare these properly with their own utensils. The importance of teaching through simple and practical demonstrations is stressed in nurses' training courses.

In an attempt to teach the early supplementation of the infant diet with suitable vitamin and protein-containing foods, we have prepared posters illustrating the different foods which may be introduced to the infant's diet between one and twelve months. These have been distributed in all the territories. The outline for a new series of posters is always discussed during a visit to the territory. Sketches are then prepared by the Poster Section of the Fiji Public Relations Office, and these are returned to the territory for final criticism and for translation of captions. The posters are then printed in Fiji by the silk-screen method.

These posters have two functions: they are useful for illustrating talks on infant feeding, and, when left in the village, they provide a reference for mothers.

Nurses sometimes complain that the women's committees become tired of seeing the same pictures at meetings. From our experience we commend the system in Rarotonga, where every head committee woman sees that the posters are displayed in the village. This kind of display should of course be supplemented by illustrated pamphlets, regular talks and demonstrations.

The flannelgraph is proving to be the most useful aid for illustrating health talks. The equipment is simple, compact and durable, and the health stories which the nurse can illustrate are endless. This year, the Fiji nurses have learnt how to make flannelgraphs to illustrate their talks on infant feeding.

THE SCHOOL CHILD: When the five-year-old child starts his school career, he is often faced with complete disruption of his nutrition. Many Pacific island children have to walk long distances to school. In order to get there in time, they leave home early in the morning before the family breakfast has been cooked. Their morning meal usually consists of a piece of taro, and another piece is taken along for lunch. When the little children return home at night, they are too tired to digest and absorb their evening meal properly. The demands of such a daily routine sometimes causes loss of weight.

Observations in two schools in Fiji have shown that growth and gain in weight is very slow during the first year, when the child is adjusting to the new

conditions. Colds and skin infections also appear to be more prevalent in this age group.

In Fiji, some village schools have successfully introduced school lunch schemes. At school "A", a special house has been built for the lunch. This has half-open walls, a thatch roof and concrete floor. The children bring their basic carbohydrate food from home, and this is supplemented by a generous serving of fish, or vegetable and coconut soup, prepared and served by teams of mothers from the different villages. Lunch is supervised by one of the teachers. During the last three years there has been a marked improvement in foods brought from home. In 1951, lunch at this school consisted of a piece of starchy tuber. Now, nearly all children bring some fruit or fish to eat with their taro, tapioca, etc.

At "B" school in the same district, the head teacher inspects the foods brought to school and supervises the midday meal. Criticism and advice carried home by the children has been heeded by mothers, and the majority of children now bring a good selection of foods. In 1953, both schools were unable to carry on with the schemes, but these were resumed in 1954.

During the two years a record of heights and weights was kept. As the number and age composition of the schools remained approximately the same during this period, it was possible to compare the average gain in weight per child. The weight studies revealed an increased gain in 1954, when lunch schemes were resumed, and the head teachers agreed that the learning capacity of the children improved during this year.

AVERAGE GAIN IN WEIGHT IN LBS. PER CHILD AT SCHOOLS "A" AND "B", 1953 AND 1954.

	BOYS				GIRLS			
	1953		1954		1953		1954	
	No.	Lch.	No.	Lch.	No.	Lch.	No.	Lch.
School "A"	60	4.34	69	4.93	53	5.85	61	6.90
School "B"	33	4.59	29	4.64	40	4.56	47	6.51

The results of our work in school lunch schemes have revealed several important points. To arouse the interest of the community and the school committees, the scheme must be simple, and involve little or no cash outlay. Mothers should be encouraged to assist with the preparation and supervision of meals. Most important of all, the lunch must be based on readily-available local foods. The cost of a lunch scheme may be kept down by using local materials to make the necessary eating utensils. For example, coconut-shell cups made by the handcraft class make excellent drinking containers. After use, these should be washed in cold water and then brought to the boil in a washing copper set in an old oil drum.

Food Advice. In an effort to reach the reading and listening public, articles on food and nutrition are published in the local press and series of talks are given in the Fijian and Indian hours. Scripts of suitable radio talks have been sent to other territories for transmission over local stations.

A good lunch—taro and cabbage with coconut soup.

A bulletin called *Tropical Food and Nutrition* is published twice a year. This is designed to help two important groups —the local people who are interested in using the new foods which appear in the stores, and the newcomers to the islands, who want to know how to include local foods in a European type of diet. Poor family nutrition develops easily in the tropics when people do not know how to use the foods around them. Appetising food is surely one of the delights of life, and in preparing *Tropical Food and Nutrition*, we have had in mind the Government Officer's wife confronted with a larder full of tinned meat and taro, and the nurse and teacher who want to enlarge their daily menus to include some of the more nutritious European dishes.

Food Supplies. Research and education will not alone solve nutrition problems. A great deal of our time is spent in planning food supplies and in advising and demonstrating how those should be used. In all the territories visited, the administrations have been advised on suitable ration scales for labourers, and groups of people living in institutions.

Good nutrition costs money, but costs can be greatly reduced if food is purchased in an economical manner. In Fiji, all Government institutions obtain their groceries through a bulk purchasing scheme. The nutritionist advises which food should be imported and when these arrive in the Colony, institutions are shown how to use the supplies properly.

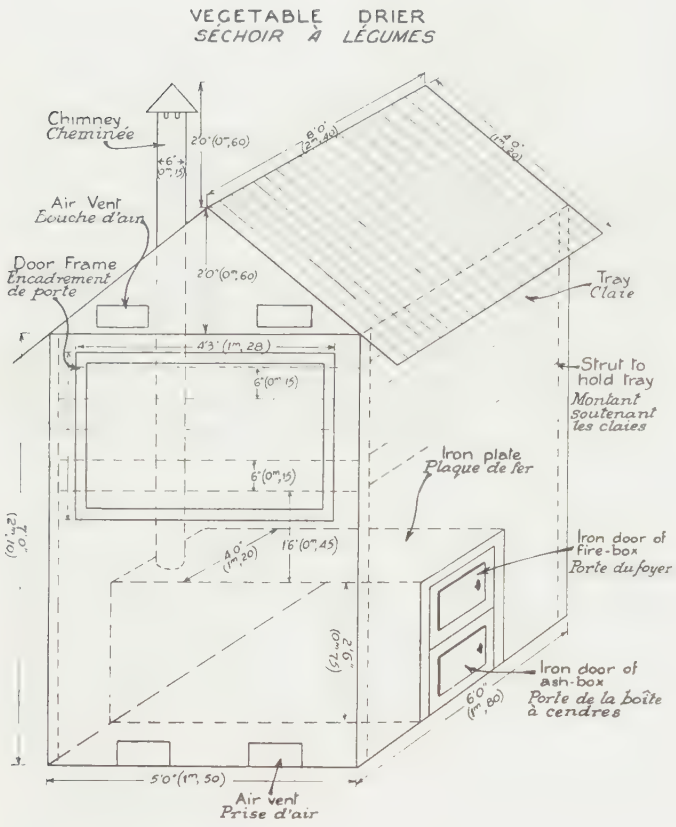
Experiments have been arranged to introduced dried skim milk, whole grain cereals and other useful foods. Once these foods have been found successful in institutions, the stores are encouraged to stock supplies for local sales.

In Fiji, we have had noticeable success in the introduction of dried skim milk powder. In 1950, this milk powder was used in limited amounts by farmers for stock feeding. Now it rates as one of the best-selling grocery lines. According to trade reports, imports of processed milk have increased by 52% in the Colony during the last four years. Dried milk has now replaced sweetened condensed varieties as the top selling line.

Training Nutrition Workers

No programme can succeed without

(Continued on page 41)



Dimensions of the drier are shown in this sketch. Brief constructional details are given in the accompanying article.

Drier For Preservation Of Bread Fruit

Dehydration of breadfruit can be successfully carried out by this vegetable drier developed in Ceylon. Slices of breadfruit dried by this process can be kept in an airtight container for several years.

By JACQUES BARRAU*

IN 1949 the Department of Agriculture in the Seychelles Islands conducted some trials for the preservation of sliced breadfruit by dehydration in a copra drier.

The breadfruit was picked while still green but of full size, and then cut into slices approximately half an inch thick. The sliced fruit was dried in the copra drier for four days at about 120° F. and then packed in air-tight containers, where it kept in good condition for as long as six months.

Sun drying can also be used, but it is a longer process and not as reliable as the method described above.

In Ceylon, a type of vegetable drier has been specially designed which can also be used for breadfruit dehydration. This drier was described by C. Charavanapavan, in an article on food preparations published in *Tropical Agriculturist* (103, vol. 2, 1947). The accompanying sketch of this drier, which was sent to the Commission by the Colonial Products Laboratory, shows clearly its characteristics.

Constructional Details

In the article quoted above, the author gives the following details of this vegetable drier and on the way of using it:

"The drier consists of a dehydration chamber made of bricks and is 6 ft. long, 5 ft. broad and 7 ft. high at the sides. The roof is made of corrugated galvanized iron sheets. The single door is 4 ft. 3 in. by 3 ft. On each of the two side walls are fitted wooden struts over which five bamboo slat bottomed trays can be stacked in layers in a staggered form.

"The drier is heated by means of a fire box to which is fitted an iron plate one-eighth of an inch thick with a layer of sand half to one inch thick on the top, to radiate the heat evenly into the drying chamber. A brick chimney is connected to the fire-box to provide an outlet for the smoke.

Two air vents are provided at the base of the front and back walls and two vents each are provided at the top as well. These air vents are provided with adjustable panels to control the passage of air in and out of the drier.

"The vegetables are sliced and immediately placed in a weak solution of salt (½ lb. of salt per gallon of water). They are then blanched in boiling water for about 3 to 5 minutes. By this treatment the vegetables are prevented from undergoing discolouration on drying. The blanched vegetables are allowed to drain free of water and then spread out in thin layers on to the bamboo slats and dried at 70° C. to 50° C. for four to six hours to a moisture content of about 8 per cent. to 10 per cent. The temperature inside the drier could be determined by suspending a thermometer. The temperature can be controlled by adjusting the air vents and the rate of firing."

According to additional information given by the Colonial Products Laboratory, breadfruit slices dried by this process can be kept for two or three years in an air-tight container.

* Subsistence Agriculture Officer, South Pacific Commission.

Commission Plans Training Course In Health Education

DR. G. LOISON, Research Officer for Health to the South Pacific Commission, and Mr. L. L. Keyes, Health Education Officer, Regional Office, World Health Organization, Manila, have completed a tour of South Pacific territories to learn what health education work is being carried out in the area with a view to suggesting to their organizations ways in which they might help. They visited the New Hebrides, Tahiti, Western Samoa and American Samoa, Dutch New Guinea and Australian New Guinea, New Caledonia and Fiji.

The South Pacific Commission is planning a training course in health education in 1957 for assistant medical practitioners, nurses, teachers, sanitary inspectors and others whose work would be enhanced by knowledge of health matters. The course will last from eight to ten weeks.

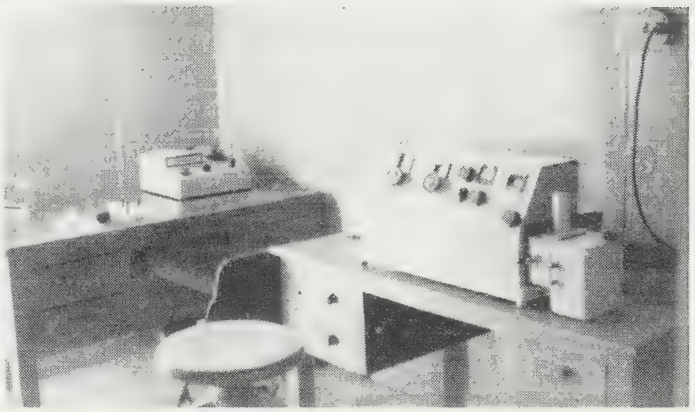


Figure 1 (left): Laboratory assistant Mlle. M. Tomono making an analysis in the Commission's laboratory. Figure 2 (right): The "Unicam" spectrophotometer, which is used for most of the vitamin determinations.

Analysis Of South Pacific Foods

Because, nutritionally, little is known of South Pacific foods, the Commission has set up a food analytical laboratory in Noumea to investigate them.

By F. E. PETERS*

A KNOWLEDGE of the composition of the foods eaten by the peoples of the various territories of the South Pacific is useful and necessary for nearly everyone interested in the welfare of these people. The Agricultural Departments need this information in their extension work to encourage people to grow better and more nutritious crops; the authorities responsible for labour and hospital rations use it to formulate sound diets; it helps medical officers and nutritionists to assess illnesses which may be caused by specific dietary lacks, and to advise on ways to improve the diets.

* * *

All foods are made up of different substances, fats, carbohydrates (such as sugars), proteins, vitamins, minerals—but the proportion of each of these varies considerably from food to food. For example, cassava (also known as manioc or tapioca) is composed almost entirely of carbohydrates and water, while fish and meat are composed largely of protein. It is the blend of these various constituents which determines the nutritive value of a food. Apart from the purely energy-providing constituents—carbohydrates and fats—the important factors in determining this value are the vitamins and proteins.

Foods used in Europe and the United States have been thoroughly investigated during the past fifty years, and much is now known of their composition. However, foods of the South Pacific have only received little attention, and, nutritionally, are largely unknown. To overcome this lack of knowledge, and to aid its field workers and others interested in the peoples of the region, the South Pacific Commission has established and built up a food analytical laboratory to investigate the indigenous foods.

This laboratory has been set up in Nouméa, and through the generous co-operation of Dr. F. Bugnicourt, Director of the *Institut Français d'Océanie,* is housed in the Institute's Chemical Laboratory. The laboratory buildings are new and well set out. Adequate space has been loaned to the Commission to enable it to carry out all the analyses required.

In this laboratory the various foods received from the different territories are analyzed for their general components: water content, fat, carbohydrate, protein, etc., and also for their vitamin content and amino acid make-up.

Williams-Waterman Grant

Aided by a generous grant of money from the Williams-Waterman Fund, Research Corporation, New York, the Commission has been able to purchase the equipment necessary to extend the work of the laboratory to permit it to investigate the vitamins present in the foods. The vitamins to be estimated include vitamin A precursors, vitamin C (ascorbic acid), vitamin B_1 (thiamine), vitamin B_2 (riboflavin), niacin and vitamin E (tocopherols). A knowledge of these substances is essential, as a lack or insufficiency in the diet leads to many serious diseases; for example, beri-beri is due to lack of vitamin B_1. The most important instrument used in vitamin analyses is the spectrophotometer.

With the proteins in the food, it is not sufficient to know the quantity of protein present, but it is also necessary to know the biological value of the protein, which is a measure of its effectiveness in aiding growth, reproduction and the repair of tissues. Proteins are complex substances made up of combinations of chemically simple compounds called amino acids. Each protein may consist of sixteen to twenty (or more) individual amino acids compounded in varying proportions, e.g., Table I shows the amino acid composition of different foods.

TABLE I: AMINO ACID COMPOSITION OF CASSAVA FLOUR, RICE AND BEEF MUSCLE.

AMINO ACID	CASSAVA FLOUR[1] mg/100g.	RICE[2] mg/100g.	BEEF[3] mg/100g.
Essential amino acids:			
Valine	52	505	1,120
Iso-leucine	40	425	1,140
Leucine	59	665	1,840
Threonine	42	310	1,050
Methionine	20	250	640
Phenylalanine	45	405	970
Tryptophan	11	105	240
Histidine	24	140	840
Lysine	71	260	2,040
Arginine	74	575	1,180
Other amino acids:			
Aspartic acid	90		2,150
Glutamic acid	258		3,500
Glycine	48		1,050
Alanine	93		1,360
Serine	38		990
Cystine	12	105	280
Proline	31		770
Tyrosine	32	465	860
Ornithine	211		

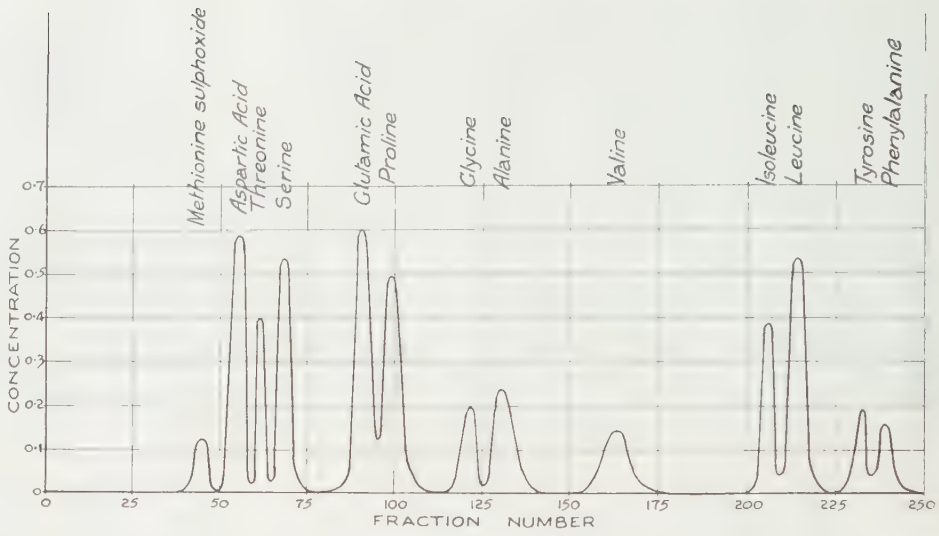
[1] Close, J., Adriaens, E. L., Moore, S., and Bigwood, E. J.: Bull. Soc. Chem. Biol., *35* 985-992 (1953).

[2] Calculated from Block, R. J., and Bolling, Diana, "The amino acid composition of proteins and food," 2nd Ed., Charles C. Thomas, Springfield, Ill., U.S.A. (1951). Assuming 1.3% total N.

[3] Bigwood, E. J., Crokaert, R., and Billinski, E.: Bull. Acad. Roy. Med. Belge, *18*: 82-110, (1953).

* Biochemist, South Pacific Commission.

Figure 3: Graph of typical amino acid analysis.



The human body breaks down the proteins found in the food to the individual amino acids and, from these, it builds up its own proteins. The body is able to manufacture some amino acids itself, but it has been found that there are ten amino acids which it cannot make, and these must be supplied in the food. The content of these amino acids, known as "essential amino acids", largely determines the biological value of a protein. A protein which lacks, or has a very low content, of one or more of these essential amino acids, has a low biological value, and it will not support growth and development. As very few proteins contain all the essential amino acids in the correct proportion, it is necessary to have a varied diet. In this way, one food which contains much of one amino acid, say tryptophan, but lacks another, say methionine, will supplement a second food which contains little tryptophan but plenty of methionine.

Two complementary methods for the determination of the biological value of proteins are available. These are: (a) biological and (b) chemical.

Using animal (usually rat) growth experiments, it is possible to determine whether the protein of a food will support life and growth while the chemical determination of the amino acids will indicate which "essential amino acids" are present in small or limiting quantities.

From a knowledge of the amino acid make-up, it is possible to predict fairly accurately what the biological value will be, but, if possible, growth studies should also be carried out. In Nouméa, the facilities are not available to carry out growth studies, and effort is being concentrated on the chemical index.

Figure 4: The fraction collector used in the amino acid determinations.

New Techniques Simplify Analysis

The determination of the amino acids in proteins has, until fairly recently, been a difficult and tedious operation. However, techniques developed during the past ten years have simplified the analysis and made the results more reliable. The Commission's laboratory is now equipped to handle amino acid estimations, using a method developed by Drs. Moore and Stein of the Rockefeller Institute for Medical Research in New York, U.S.A.

In this method, the protein is broken down chemically to its individual amino acids by boiling with acid; a process known as hydrolysis. The mixture of amino acids is concentrated to a very small volume and placed on the top of a long 150 cm.) column of a resin, and slowly washed through the column with different solutions of salts. It has been found that the amino acids are absorbed by the resin and washed off at different rates by the salt solutions.

If all the solutions passing through the column are collected in fractions of, say, 2 ml., and each 2 ml. fraction analyzed for its content of amino acid, and the results graphed, a series of peaks similar to those shown in Figure 3 will be obtained. Each peak represents an individual amino acid and the area under the curve is a measure of its concentration. As it has been found that the amino acids are washed off the column in the same order each time (depending on certain conditions being met), the resulting graph shows what amino acids are present in a food, and what is more important, how much of each amino acid is present.

For a normal estimation, between 400 and 500 fractions must be collected, and as this takes from 6 to 7 days, an instrument, the fraction collector, has been developed. This is a device which automatically collects predetermined volumes of liquid. The model being used in Nouméa is shown in Figure 4, and consists essentially of a syphon mounted on a counterbalanced arm which in filling and emptying operates a mechanical escape mechanism. The whole arm is moved by a spring, so that when one fraction is deposited in a test tube, the syphon moves to another empty tube. This particular machine can collect up to 90 fractions without attention.

Results obtained to date indicate that the coconut and taro proteins are of good biological value. These results together with others will be published later as a Commission Technical Paper and in various technical journals.

From the results now being assembled, it is hoped to be able to supply all those interested in the foods of the South Pacific area with a comprehensive set of values for the major constituents found in these foods, and with an indication of the biological value of the proteins.

Bulletin On Control Of Soil Erosion

A BULLETIN on soil erosion and its control in Fiji has been published by the Department of Agriculture there. The author is Mr. C. E. Whitehead, Soil Conservation Officer. The bulletin deals first with the causes of erosion and then shows how bad farming methods can destroy the land. The second section describes methods of preventing erosion by controlling water flow, correct cultivation and pasture management, and planting trees. There is a chapter on methods of keeping soil fertile, and a list is given of things a good farmer does and those of which a bad farmer is guilty.

There are nearly 60 photographs, illustrating the menace which soil erosion presents to the Colony. Copies of the bulletin are available from the Dept. of Agriculture, Suva; price, 2/-d.

Above: Part of the herd of sixty Friesian-Holstein dairy cows at Taravao Station.
Right: Pasture at Taravao Station; volunteer grasses, mainly species of Paspalum.

Dairy Farm Successfully Established In Tahiti

The successful establishment at Taravao Station in Tahiti of a dairy herd of sixty Friesian-Holstein cows has demonstrated the possibilities of similarly developing the industry in other high islands of the Pacific.

By H. S. McKEE*

THE consumption of milk products per head of the population is fairly high in Tahiti. These products were almost entirely imported until a station recently opened by the *Service de l'Elevage* (Department of Stock of French Oceania) began to supply fresh milk to the town of Papeete. The successful development of this station has demonstrated the possibilities of dairying in certain parts of Tahiti. It is probable that similar methods could also give good results in some of the other high islands of the Pacific.

The station is known as Taravao, being situated near the low isthmus of that name which joins the two mountain masses forming the island of Tahiti. The smaller of these masses forms the peninsula of Taiarapu, also called Tahiti-iti (Little Tahiti). The pastures of the station are at an elevation of about 1,600 feet (500 m.), on a plateau formed by the gently sloping foothills of the mountains of Taiarapu.

The land in its natural state carries dense but not very high mixed forest with puarata (*Metrosideros collina*), firs, pandanus, tree ferns and many other trees and shrubs. Some areas which were cleared earlier have reverted to guava and lantana, the introduced shrubs which invade disturbed ground so aggressively throughout the islands.

The natural vegetation is cleared by bulldozer, and the stumps and boulders are removed. The sown pastures consist of molasses grass (*Melinis minutiflora*); a fairly good pasture is also obtained with volunteer grasses, mostly species of *Paspalum* (*P. conjugatum, P. compressum, P. orbiculare, P. notatum, P. dilatatum*); other volunteer grasses of some value in the pasture include *Trichola-ena rosea, Cynodon dactylon* and *Eleusine indica.*

The only legume which appears spontaneously is *Crotalaria striata.* Many other legumes have been sown without finding any which makes an important contribution to the pasture. It may be that the legumes tried were unsuitable for the climate of Taravao, but the soil may also be deficient in some minor element. It is known that most legumes require more molybdenum and probably more boron than grasses. *Leucaena glauca* (a leguminous shrub also known as mimosa) is considered in Tahiti to be a useful fodder for cattle, but it grows only at lower elevations.

Once established, the pastures are kept free of weeds by spraying with the herbicides 2,4-D and 2,4,5-T. The most important herbaceous weed is false tobacco (*Elephantopus* sp.); among the shrubby weeds the worst are guava and a raspberry (*Rubus rosaefolius*). The latter is found in many of the islands but rarely becomes a troublesome weed.

Cassava (manioc) is cultivated to provide supplementary feed for the 60 Friesian-Holstein cows, imported from New Zealand, which form most of the milking herd. A white manioc which reached Tahiti from the Cook Islands has given excellent results. The application of artificial manures to manioc has been found profitable; a yield of 43 long tons per acre (108 tonnes per hectare) has been recorded for a field receiving 600 lbs. per acre (500 kg. per hectare) of a mixed fertilizer supplying nitrogen, phosphorus and potassium, plus 8,000 lbs. per acre (9,000 kg. per hectare) of coral sand.

Some copra press-cake is also fed to the cows, and special meal is used for the calves. These are only minor sup-

(Continued on page 43)

* Food Technologist, South Pacific Commission.

Figure 1 (left): The Gorontalo method of sun-drying copra. The coconut meat extracted from the nut is placed on bamboo trays, which are usually supported above the ground, as shown. During rain the trays are stacked one on top of the other, and covered with palm fronds.

Figure 2 (above): A drying floor as used by trading stations further to dry copra that is too moist. Of about 100 square metres in area, the floor is provided with a removable roof that can be closed over it during rain.

Curing Copra On Smallholdings In Indonesia

A survey of various methods used by smallholders in Indonesia for curing copra . . .

By P. M. L. TAMMES*

COMPARED with other crops, coconuts need only a limited amount of labour per acre, evenly distributed over the year. On an average, one man can take care of 12-17 acres of mature trees, including harvesting and curing. Such a crop is well suited for regions with plenty of uncultivated soil and few labourers, provided that both soil and climate are favourable.

In Indonesia, coconuts were formerly planted as a food crop for daily use, mostly near houses. Gradually, however, as the demand for copra developed on western markets, extensive cultivation developed all over the islands.

There are very few estates in Indonesia, and the bulk of the copra exported comes from smallholdings. As the overhead expenses for the smallholder are low, the cost of his copra depends on the amount of labour he has to employ in picking and curing, and in maintenance of his palms. Per 100 kg. of copra, this is about three man working days, exclusive of transport to a trading centre.

Copra Curing

Wet coconut meat contains, by weight, about 50 per cent. water. During curing, this must be reduced to a moisture content of 6-9 per cent. of dry weight, when the copra may be shipped.

Curing is carried out either in the sun or by fire, depending on the climate. Both methods have their disadvantages in regard to decay. In wet meat there is much danger of bacterial rotting when drying is too slow in the first days, e.g., with rain or clouded sky. After the first drying period (called pre-drying) this danger is over.

Copra pre-dried over fire seldom shows bacterial rotting. When, however, pre-dried copra is stored in bags or heaps, moulds develop, which also cause decay. Self-heating occurs, and the copra is dried out by its own heat. In this latter case, about 4 per cent. of the copra is lost, because it is digested to carbonic acid and water by the moulds. Also, the quality becomes worse and the free fatty acid content of the oil increases.

Removal of the residue of water takes considerable time, and this is the reason so much copra is traded with excess moisture. During curing, the meat does not release its water at the same rate. At first this is very rapid, especially over fire, but it finally becomes slower and slower. The ideal procedure for all climates is pre-drying over fire, followed by re-drying in the sun on drying floors or trays for at least four days. A few rainy days, or cloudy weather, do not harm pre-dried copra.

The process, however, should be prolonged until the copra is sufficiently dry. The experienced can very well estimate the right moment for bagging by breaking a few pieces and judging them by their crispness.

In the accompanying table, various methods used in Indonesia for curing copra are listed. Some of them, which can be recommended for practical use, are discussed below.

The Gorontalo Method

The whole fruits are collected and split with an axe. The wet meat is cut out with an iron spatula and taken home. The meat is placed on bamboo trays (Fig. 1) in one layer, with the white side upwards. Drying is carried out in the sun for 6-9 days. The trays are

* Dr. Tammes, of the Netherlands Plant Protection Service, was formerly Chief of the Coconut Experiment Station and of the Macassar Branch of the General Agricultural Experiment Station in Indonesia.

rectangular, about 1.25 x 2 metres, and are usually supported on poles above the ground. During rain they are placed one on top of the other and covered with palm fronds.

In dry, sunny weather, excellent copra can be made. With rain or clouds in the first days there is danger of bacterial rot. Between the splitting of the nuts and drying, not too much time should elapse. Therefore it is usual not to split any fruits in rainy or cloudy weather, so that the meat always receives a few hours of sunshine during the first day. The method is suited only for dry periods or in dry regions.

North Celebes Method

The kiln has a grill of bamboo or palmwood slats surrounded by bamboo walls and a roof of palm fronds. The roof extends on one side to make a small verandah for the men in case of rain, or for storage of copra or bags. A common size for two men is 6-7 square metres of grill, with a charge of about 1,000 nuts per night.

In kiln drying it is always necessary to transport the whole (or husked) nuts to the kiln. Wet meat, cut out from the nuts, cannot be dried on such kilns. Only half nuts must be dried. Curing of small pieces of cut-out meat on a grill always gives very bad copra, due to clogging of the hot air circulation.

In this drying method the nuts are husked, split in halves, and left some time with the meat downwards for leaking. They are then arranged on the grill, the first (lowest) layer with the meat upwards, and the other layers with it downwards, inclined at an angle of around 45 degrees to ensure good circulation of hot air.

Heating is carried out by a small fire of dry husks in a firepit dug in the soil. Drying usually starts in the evening and lasts until the following morning. A bamboo spray and a pail of water are always kept ready to extinguish any fire in the copra or kiln.

In the morning the meat is separated from the shells by an iron spatula. If it is re-dried on the kiln, which is not usual, it is not cut. When bagged, it is cut in pieces first. The copra is still moist, and some 10-15 per cent. excess moisture must be dried out before it can be shipped.

Storage or shipping of this copra without re-drying leads to self-heating and mouldy copra of low quality, and a loss of around 4 per cent. of copra by digestion through the moulds.

Good quality (FM) can, however, be obtained by re-drying this copra. Traders use large drying floors on which the copra remains in thick layers (up to 15 cm.) for about 4-6 days. There is no fear of deterioration, even if there is rain and the roof is closed for some days. The copra is mixed twice a day with shovels.

The Charcoal Method

With this method and additional re-drying, prime FMS copra can be made. The kiln is of the same type as the North Celebes kiln, but the grill is about one metre above the soil. For two men the grill is 6-7 square metres, with a capacity of 1,000 nuts a day. The halves are arranged in 6 layers, all with the meat downward, and inclined at an angle of about 45 degrees for better air circulation.

Firing is carried out by burning shells in small heaps, each of about 20 half-shells, in front of the kiln. When the smoke ceases, they are thrown in the kiln and there give a smokeless fire. All the shells of the previous batch are used. One man is continuously occupied making small heaps of shells, firing them, and throwing them in when the smoke clears.

After pre-drying, the kernels are taken out and re-drying takes place in the sun on trays. Alternatively, the trader carries out this operation on drying floors (Figs. 1 and 2).

METHODS OF CURING COPRA IN INDONESIA

METHOD	FRUITS	KILN	PRE-DRYING	RE-DRYING	QUALITY	REMARKS
North Celebes	*Husking of fruits. Nuts split in halves.*	*Kiln with grill, walls and roofs.*	*Fire of dry husks.*	*On drying floors.*	*Good FM*	*A very good quality FM (mixed) is made, when re-dried on floors for about 4 days. Good for all regions.*
Toli Toli ..	*Whole fruits split with axe.*	*No.*	*In sun.*	*In sun.*	*FMS or FM.*	*Bad quality with rain or clouded skies. Suitable only for very dry regions or periods. Fruits with open side upwards are reversed when rain comes.*
Gorontalo ..	*Whole fruits split with axe. Wet meat cut out.*	*No.*	*In sun on bamboo trays.*	*In sun on bamboo trays or drying floors.*	*FMS or FM.*	*Suitable only for dry regions or periods, bad quality with rain or clouded skies.*
Charcoal	*Husking of fruits, nuts halved.*	*Grill with walls and roof.*	*Smokeless fire of charcoal from shells or husks.*	*In sun on trays or drying floor.*	*Prime quality FMS.*	*Prime quality.*
Ceylon	*Husking of fruits, nuts halved.*	*Grill with walls and roof.*	*Fire of a double row of dry shells.*	*Fire of shells or in the sun.*	*FMS.*	*Good method. Suitable for all regions.*
Estate Kilns	*Husking of fruits, nuts halved.*	*Kiln with sheet iron instead of grill.*	*Fire under iron sheets, nuts in one layer only.*	*In kiln or drying floors.*	*Prime quality FMS.*	*Can only be used on estates. The kiln is too expensive for the small holdings.*

The time of firing is about 6 hours, re-drying being absolutely necessary. A firepit 25 cm. deep is made in the soil about 30 cm. from the walls.

It is usual to clean the meat from germinated nuts by scraping the slimy layer on the surface with a spoon before drying.

The Ceylon Method

In general, this method is the same as the North Celebes method, though with this difference—that, instead of dry husks, dry shells are used for fuel. The shells are nested in each other, arranged in a double row along the walls of the firepit, and fired at the hollow end. When properly arranged, the fire needs no care and burns for a considerable time. The copra is somewhat yellow, but can be sold as FMS. Re-drying can also take place in the kiln when sufficient shells are available.

Faulty Copra

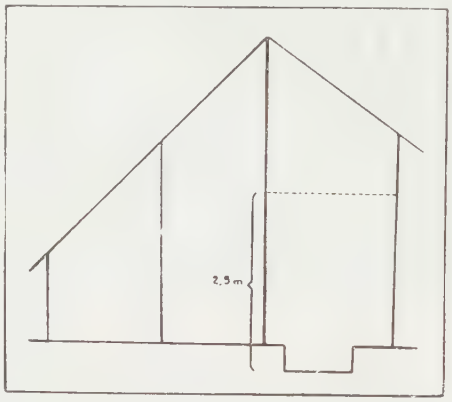
Faulty copra results from:

1. Copra being made from unripe nuts. It is thin and rubbery and deteriorates quickly. Most important, however, is that such copra is a loss for the farmer, because unripe nuts contain less copra than ripe.
2. Copra being made from germinated nuts. These are nuts which have been overlooked at the previous picking. The copra is thin, fatty, and is also a loss for the farmer, because part of the copra has been digested by the sprouts.
3. Bacterial rotting, due to the drying process being too slow in the beginning. The result is a poor quality of oil and an inferior press-cake.
4. Mouldy copra. This results when re-drying has been insufficient, e.g., when copra is bagged, stored or shipped in a moist state. Such copra heats itself dry, but there is a loss of 2-4 per cent. in weight, an increase of the free fatty acid content of the oil, and a poor quality of oil and press-cake.
5. Heavy smoke, which gives a dark oil and press-cake.
6. Scorched or burnt copra, which is caused by too high a temperature. Inferior oil and press-cake result.

A very common fault is the harvesting of unripe nuts. In regions where sun-drying is used, bacterial rot is a common fault when rain or cloud develops during the initial drying. Also, mould appears when moist copra is stored and not re-dried. In regions where kiln drying is used, the usual fault is mouldy copra caused by lack of re-drying. To a lesser extent, it is due to too heavy smoking.

Moist copra is a common fault in all regions. It can be prevented only when moist copra is refused in trading stations. A better alternative is to re-dry it at the trading station on drying floors.

In North Celebes there are many such drying floors, each with a surface of about 100 square metres and a roof that can be closed over it in case of rain (Fig. 2). The copra is mixed once or twice a day and left for 4 days, or, in case of rain, a few days longer, until it is sufficiently dry. The layer is up to



Sketch of kiln as used for the North Celebes method of drying copra.

15 cm. thick. After re-drying, the copra is bagged for about 3 weeks, after which it can be freighted and shipped.

Considerations of Quality

At the oil mill, the quality is judged on the percentage of free fatty acids in the oil, and the colour of the oil and press-cake. With refining processes, the free acid is neutralized and the colour bleached. This, however, costs money, which causes the difference in price between good and bad copra. There are also other factors; for example, the quality of the press-cake, and the tendency of oil from bad copra to become rancid.

On the isle of Java, where the oil mills sell unrefined coconut oil for consumption, the copra must be of very good quality, and the preference for high grades is marked.

For whole shipments, grading based on chemical analyses would be possible, provided that sampling has been correct. For buying copra from the smallholder, however, this is impossible, and grading must be based on general appearance. A distinction is made between two qualities of copra. The first, smoked and of a brown colour, is called mixed or FM copra. The second, unsmoked copra that is white in colour, is called sun-dried or FMS (fair merchantable sun-dried). Bad FMS is traded as FM.

It is also usual to state the region the copra is shipped from, e.g., Ceylon FMS, Indonesian FM, etc. FMS is better-priced than FM, but the difference is often so small that it does not compensate for the extra care.

At the beginning of the war, the trade in copra in Indonesia was centralised in a government-sponsored institute, the so-called "Copra Fund". This was continued after the Japanese occupation. The fact that there was a single buyer made standardization possible. All copra was bought in a dry state, that is, free from self-heating after 3 days, and weighed after 3 weeks.

Before buying, the copra was inspected and graded according to the percentage of defective pieces by weighing, and limits were set for unripe nuts and for total faults. Further requirements were that bags should be of a certain size and weight, and should be clearly marked to make inspection easy.

For sampling, 25 handfuls of copra from different parts of a parcel not exceeding 25 tons were mixed, and 2 kg. were weighed and kept separate. From this last sample the defective pieces were gathered and weighed when necessary, and the percentage of the different faults calculated.

Improvement of Quality

Improvement of quality is not a technical but an economic problem; it depends on the price difference between the grades. This is only slight, and often smallholders sell any quality the trade is willing to accept. With a single buyer's organization as existed in Indonesia during the war, it was, however, possible to prevent considerable loss of copra for the smallholder, by limiting the percentage of copra made from unripe nuts, and on the other hand by re-drying and by refusing moist copra.

Preparing Dried Cooked Fish

MR. H. VAN PEL, the fisheries expert of the South Pacific Commission, has recently shown that dried cooked fish can be prepared by very simple means.

In both Papua and the Solomon Islands he boiled fresh fish (cleaned by removal of the intestines) for 30 minutes in a mixture of equal parts of sea water and coconut milk. The flesh was then removed from the bones in fairly small pieces, spread out on a sheet of corrugated iron and dried for 24 hours over a slow fire of coconut husks.

The fish flakes so produced had an attractive lightly-smoked flavour, and reconstituted readily on heating with water, making an excellent ingredient for soups and stews. They contained 3% of water and 56% of protein.

Such a product, being light and not quickly perishable, offers a very useful means of transporting fish from the coast to the inland people of the larger islands where diet is often very deficient in animal protein.—H. S. McKee.

Left: Unloading imported foods, including flour, milk products, canned meat. Fare, Huahine, Iles-sous-le-Vent. Right: Schoolboys with bread made from imported flour. Maeva, Huahine, Iles-sous-le-Vent.

Cash Crops And Imported Foods In The South Pacific

In recent years production of cash crops in the Pacific has steadily expanded, and in most territories a money economy is now firmly established. In this survey the author points out that there are, nevertheless, good reasons why Pacific Islanders should not become too completely dependent on cash crops, but should retain their subsistence agriculture as well.

By H. S. McKEE*

CASH crops have long been cultivated by the native peoples in some areas of the South Pacific, but over the region as a whole they are less important than the subsistence crops eaten by the people who grow them. Sometimes, the family or group growing a particular crop has the choice of selling the produce or eating it themselves. This happens with coconuts, which may either be used for food or drink, or kept to make copra, which can be sold for cash.

Coconuts grown originally as a source of food provided an early export crop sold to Europeans in the Pacific Islands. As early as 1840, traders from Australia are recorded as buying coconuts in New Caledonia and shipping away the oil extracted from them by wasteful small-scale methods. Shipment of copra was a later development and still dominates the handling of coconuts, but there is a trend towards the shipment of oil again. The coconut oil shipped from the islands today is produced in efficient modern factories similar to those handling copra in the importing countries. At first the coconuts used in trade were those not actually required at the time of sale. Later, coconuts were planted specially to provide a saleable crop additional to that used for food on the spot.

Finally, there were planted crops not used at all as food by the village people, though in most cases their ultimate use was for food. Cocoa is a good example of this group; a little is used as food by those who grow it in Samoa, but many native growers sell their entire production.

* Food Technologist, South Pacific Commission.

Copra Still Most Important Crop

The most important cash crop for natives is still copra. Coffee is well established as a native crop in New Caledonia, and has made a start in the highlands of New Guinea. Extensive native plantings of cocoa in Western Samoa and those now coming into bearing on the Gazelle Peninsula of New Britain have their counterparts on a smaller scale in several other territories; the long-continued high price of cocoa ensures considerable interest in this crop wherever soils and climate are suitable for it.

Bananas, shipped on a large scale from Fiji, Western Samoa and Tonga to New Zealand, provide an outstanding example of successful handling of a perishable product by native growers. Fruits and vegetables are grown for the market in the neighbourhood of most European settlements and shipped from the Loyalty Islands to the Nouméa market. The Cook Islands export tomatoes and oranges to New Zealand. Rice and peanuts are grown as cash crops in several widely separated districts of New Guinea. A few small islands in French Oceania produce an appreciable part of the world's supply of vanilla.

It is thus clear that natives in different parts of the South Pacific have successfully grown a wide range of crops for sale. Most of these crops are recent introductions, with the one very important exception of the coconut. Minor amounts of the traditional root crops are also produced for sale near urban centres. The production of cash crops has been aided and encouraged by the administrations, which have often provided the initial planting material, and also advice on methods of cultivation, harvesting and marketing.

The handling of export crops after harvesting is very important, as deterioration or faulty processing can seriously reduce the return to the producer. A high level of quality is harder to achieve with hundreds or thousands of small producers than with a comparatively small number of large plantations. Collection of the product and supervision of those stages of handling which take place at the point of production are both difficult when many small, and possibly scattered,

farms are involved. Moreover, native growers, in the early stages at least, may require technical advice and assistance more urgently than European farms and plantations.

Extension of native cash crops should therefore be expected to require the strengthening of agricultural advisory services and an intensified watch for insect and fungal pests. The extent to which such assistance is needed will vary with the crop, the people growing it, and the way it is grown. Some European vegetables, introduced into the highlands of Australian New Guinea with little more encouragement than the supply of seed, are grown by the natives using their traditional gardening methods, and are providing cash crops of some importance in spite of the serious handicap that the only available markets of any size must be reached by air.

Effect On Native Economy

The production of cash crops on a large scale must have far-reaching effects on a native economy. In most of the accessible parts of the South Pacific, a money economy is now firmly established, and even natives who are completely self-supporting in food, use money to buy such things as clothes, tools and matches. There is also a widespread desire for manufactured goods, including many elaborate and expensive items, as is shown by the promises of material wealth held out by the leaders of cargo cults and similar movements among native peoples.

The two main ways in which they can earn money are by the sale of their labour or of the products of their gardens. Products of fishing, hunting, mining, handicrafts or collection in the forests are, in general, of minor importance, though sometimes significant in particular localities.

Working for business organizations, plantations and various agencies of the administrations has, in the past, been the main source of money incomes for native peoples in our area. At present, however, the tendency for increased production of cash crops, and the high prices which they now command, are causing the natives in some districts to rely more completely on the sale of produce from their own gardens, and consequently to be less willing to offer for outside work. Thus, in many areas with an important output of plantation crops, production is only maintained by importing labourers from areas which are less suited for the production of cash crops by natives, or less fortunately placed in relation to markets.

It has been suggested that this export of labour, which affects particularly the younger and more active men, is liable to reduce the production of subsistence crops. There is, however, probably a genuine surplus of labour in most villages. Traditionally, men occupied themselves in fighting and in heavy but occasional agricultural tasks such as clearing forests or overgrown lands for gardens. The regular routine work in the gardens was done by women. The introduction of metal tools has greatly eased the agricultural tasks performed by men; it has had much less effect on the women's work. The abolition of fighting, and the supply of more efficient tools than those previously used, must have released for other purposes a considerable proportion of the energies of men in the villages.

The natives who devote an important part of their efforts to growing a cash crop for export are thereby drawn into world trade and exposed to its fluctuations.

In recent years the price of copra, and still more, of coffee and cocoa, has been in terms of the increased cost of manufactured goods. If the prices of export crops should ever again fall as they did in the nineteen-thirties, a native population relying on them would be forced, if it wished to maintain its income, either to increase output (with consequent selling difficulties) or to seek work (at times when employment is not likely to be easy to find).

The Pacific Islands suffered considerably in the nineteen-thirties through their excessive specialization in copra. Vegetable oils in general are subject to fluctuations in demand, owing to the comparative ease with which one source can replace another, and in times of economic depression they are among the commodities most severely affected.

Some of the islands are marginal producers of copra, both in the geographic and economic senses. Freights to the main importing countries are high, shipping services infrequent and irregular, and handling costs, in the remoter islands, extremely high. The recent tendency to diversify the cash crops grown by natives should render the economy less vulnerable to changes in the copra market if the present long-term arrangements for copra marketing should not be indefinitely extended.

Cocoa and coffee are profitable crops at present, and seem likely to remain so in the absence of any major slump in the importing countries. They should also find useful markets in countries such as Australia, New Zealand and possibly Japan, which have comparatively good shipping links with the islands.

Subsistence Agriculture Should Be Retained

It is, nevertheless, desirable that the native communities should not become too completely dependent on cash crops, but should retain their subsistence agriculture as well. This will provide a buffer against the otherwise catastrophic effects of a sudden fall in the price of a crop, or of its failure for any reason.

In some areas, cash crops grown by natives are relatively free of pests and diseases, as with cocoa in New Britain and vegetables grown for European consumption in the highlands of New Guinea. An active and efficient plant quarantine service is working to preserve this happy state of affairs, but it is too much to assume that it will always be successful.

It is frequently observed that when a crop is first introduced into some distant land it "has no enemies" and flourishes to an extent unknown in places where it has long been cultivated. This position rarely continues indefinitely; either pests formerly attacking the crop catch up with it in its new home, or local pests of native plants or of other crops develop a taste for it. It is reported that in Tahiti the orange trees planted by Captain Cook had, fifty years later, spread round most of the coast of the island; in another fifty years they had largely disappeared owing to attacks by pests and diseases, cutting off a flourishing export trade in oranges from Tahiti to California.

It would therefore be prudent to assume that the freedom from pests shown by newly-introduced crops may not be a permanent feature of their cultivation, but that eventually the necessity to control pests and diseases may involve more difficult techniques of production, and probably higher costs. New insect pests of cocoa have already been observed in New Guinea, though no widespread damage has been reported. Native plantings in small blocks probably provide less favourable conditions for the spread of a pest or disease than are found in large plantations of a single crop, and often of a single variety. In these big blocks a pest, particularly well adapted to the variety, can spread explosively. Small blocks, on the other hand, are harder to inspect, as has been recognised by the imposition of a minimum area for cocoa plantings in some territories.

The production by native growers of substantial amounts of cash crops thus poses important problems for the agricultural services of the various administrations. It also calls for new forms of social activity, especially if co-operative organizations can be established to market products locally and to prepare those shipped overseas. The efficiency of this preparation largely determines the grade of the product and hence the price received by the grower.

Fermentaries for cocoa from native growers are already established in the Rabaul district and will be needed elsewhere as production increases. Similar central plants for handling coffee will be desirable if production increases as much as seems probable in the next few years.

From the nutritional point of view it is desirable that the diversion of resources in land and energy to cash crops

Left: Vanilla, an important cash crop in some islands of French Oceania. Right: Loading copra for export at Papeete.

should not prevent the growers from meeting most of their needs for subsistence crops.

Studies in Nigeria in the nineteen-thirties showed that native cocoa growers there bought substantial amounts of food, largely the traditional root crops of the area, from other natives. Imported foods were not of much importance, probably because at that time the price of cocoa was low and the growers far from prosperous. In the Rabaul district there is already a tendency for money earned from cocoa and copra to be used in buying store foods, and some experienced observers consider that the standard of nutrition of the people has gone down as their income has increased.

The Tuamotu Islands in French Oceania provide an extreme example of dependence on imported foods. This group of atolls, with about one-tenth of the population of French Oceania, provides about a quarter of the copra exported from the territory. Subsistence crops are now little grown, and the people eat imported foods, mainly flour, sugar, rice and tinned meat. The average consumption of flour on Raroia atoll is reported to be 410 g. (14½ oz.) per person per day. The average consumption of sugar (77 g., or almost 3 oz.) is also high.

The Tuamotus, like other atolls, provide conditions favourable for the coconut but difficult for other crops. It is therefore to be expected that imported foods, paid for by exported copra, should dominate the diet there. It is more surprising that the importance of imported foods is only slightly less in many of the fertile high islands of French Oceania, such as Tahiti, Moorea and the Iles sous le Vent. In these islands the diet of the people has changed greatly from that reported by the early travellers and missionaries.

The original diet in these islands was based on breadfruit, fehi (a starchy banana eaten after cooking) and root crops, especially taro. Coconuts were important on the atolls, and made a smaller contribution to the diet elsewhere. Sweet potatoes and yams were known but were apparently minor crops in most islands. Fish and shellfish from the reefs, and meat from pigs, were the main foods of animal origin.

The diet today is very different. Breadfruit, fehi and taro are still popular foods, but are now minor items of the diet, almost luxuries. The diet is based on imported foods, particularly flour, sugar, rice, canned meat, canned fish and milk products. In some islands useful amounts of fish are still available, in others the supply is inadequate.

The introduction of cattle and of some new crops, such as the sweet banana, has done a little to counterbalance the decline in traditional crops. Nevertheless, on balance, the present diets of a part of the population are nutritionally inferior to those used in former days, at least if we consider the position in good seasons. Some imported foods, especially those of animal origin, are nutritionally desirable, contributing protein and some vitamins to the diet. Others, such as sugar and alcoholic drinks, contribute only energy to the diet without balancing it by protein and vitamins, which are also essential. Bread as the basis of the diet probably provides more protein than root crops, but the protein of these (except cassava) may be of better quality. A diet based on root crops always contains enough vitamin C, which is absent from bread.

In some places people sell nutritionally-valuable foods in the market and use the proceeds to buy less desirable foods, such as sugar, soft drinks or alcoholic drinks. These exchanges happen mainly when foods are sold in town markets. The main export crops in the islands—copra, cocoa, coffee, vanilla—are not nutritionally more valuable than the imports which they finance.

It has to be accepted that in the immediate future, cash crops and imported food will continue to dominate the economy of many areas in the Pacific, and that this pattern of trade will extend to other areas as well. We must therefore consider how its undesirable features can be avoided without losing the benefits which some imported foods can bring.

A big contribution can be made by family gardens around the houses, as in the familiar back-yard vegetable plots or allotments of metropolitan countries. These gardens need not compete for space with the cash crops, as the villages usually have ground not fully used.

Growing of vegetables other than root crops is much better established in the Melanesian than in the Polynesian islands. The latter could well use many vegetables which are now either absent from the area or grown only to an insignificant extent. We may mention among leafy vegetables, Chinese cabbage (*Brassica chinensis* and *B. pekinensis*), the type of hibiscus with edible leaves (*Hibiscus manihot*, aibika or ngedi of New Guinea, mbele of Fiji), kangkung (*Ipomoea aquatica*), water cress, creeping spinach (*Basella alba*).

Almost in the same class come the various salad onions and chives which add so much to the flavour of the diet and contribute useful amounts of vitamins; they grow well both in Sydney and in Rabaul, and thus seem tolerant of very different climatic conditions.

Beans and pulses edible as dry seeds or green pods should be much more widely grown. Useful types include snake bean (*Vigna sesquipedalis*), pigeon pea (*Cajanus cajan*), winged bean (*Psophocarpus tetragonolobus*) and Tongan bean (*Dolichos lablab*). These and others are grown in Melanesia but neglected in the eastern islands. Melanesia also could usefully introduce some pulses from

India, Indonesia and Ceylon, for instance, green gram (*Phaseolus radiatus*) and black gram (*Phaseolus mungo*).

Other useful vegetables which deserve more widespread cultivation in the islands (though they are somewhat subject to insect pests and fungal diseases) are tomatoes and various cucurbits such as cucumbers, melons and water-melons.

Fruit trees are already cultivated in most villages, but more would be useful in some places. The Polynesian islands, which are poor in vegetable crops, are better provided with fruits, every village having bread-fruit, bananas, pawpaws (though these seem often to be regarded as food for pigs rather than for man), mangoes and various types of citrus.

In Tahiti and the surrounding islands, vi (*Spondias dulcis*), star apple (*Chrysophyllum cainito*) and various species of *Annona* (custard apple, bullock heart, soursop) are also common. There is thus no lack of fruits and vegetables which can be grown on the high islands.

The range available for the atolls is smaller, but even there composting and soil imported as ballast permit vegetable gardening. Pawpaws can be grown and the Panama berry (*Muntingia calabura*) succeeds very well. This small tree produces large numbers of small juicy fruits which contain per unit weight about twice as much vitamin C as citrus fruits. These fruits and vegetables provide variety in the diet, as well as bring to it essential vitamins in which a diet composed wholly or mainly of imported processed foods may be deficient.

Pigs and hens can be kept in the villages; they will be much more productive and less dangerous to garden crops if they are fed (perhaps on maize, pumpkins or other crops cultivated for the purpose) rather than allowed to scavenge for their food. A combination of cash crops and home gardening should provide a useful income, and permit less of it to be spent on bought foods.

Some of the value of imported food is probably lost by unsuitable handling and cooking. In some areas traditional cooking methods have been abandoned in favour of European methods which, when not efficiently used, cause much greater losses of nutrients in cooking than are possible in the traditional stone oven.

Instruction in cooking methods would be a useful activity of schools and women's committees. Part of the attraction of imported foods probably lies in their ease of preparation compared with foods taken from the garden; this advantage is lost if they are not properly handled.

It has been noted that the growing of cash crops tends to be associated with the use of the more easily grown subsistence crops. This has led to an increased importance of cassava (manioc) and of *Xanthosoma* taro (Taro kong kong of New Britain, taro des Hébrides of New Caledonia, dalo ni Tana of Fiji, Fiji taro of the New Hebrides). As far as is known, *Xanthosoma* taro is nutritionally as good as other taros, but cassava is poor in protein, even for a starchy root, and the little protein it has is of low quality. Increased dependence on cassava is thus nutritionally dangerous unless the rest of the diet provides

(Continued on page 28)

LARGE-SCALE COOKING OF VEGETABLES

Improved Methods Conserve Valuable Nutrients

By H. S. McKEE

LEAFY and root vegetables form a very important part of the diet of most native peoples in the South Pacific. Both types of vegetables provide essential vitamins and minerals; root vegetables supply also energy-containing foodstuffs, particularly starch.

The amounts of the main vitamins and minerals are fairly well known for some of the vegetables used in the tropics, though further analyses would still be useful. The figures available, however, state the amounts of the various nutrients per unit weight of raw vegetable. It must be emphasized that losses of nutrients in cooking are inevitable; with some cooking methods they are remarkably high.

In cooking, vitamins may either be destroyed by heat or dissolved in the cooking water; minerals cannot be destroyed by heat but are readily dissolved. The amount of heating and the quantity of water used in cooking have therefore large effects on these losses. An extreme example is offered by a method formerly prevalent in England for the cooking of cabbage and similar vegetables—a disgrace to English cooking. The vegetable, cut in small pieces and boiled for a long time in a large excess of water, was reduced to a fibrous mass from which the juice was carefully squeezed. This method extracted practically all of the very useful vitamins and minerals of the cabbage into the cooking water, which was thrown away. The residue, neither palatable nor nutritious, was then eaten. Such perverse methods are now less popular, but the importance of cooking vegetables with as little water as possible is still not fully realized.

Steaming reduces the loss of nutrients, as in this method of cooking the food is in contact only with a thin film of water which condenses on it. Steaming under pressure is particularly favourable, as the short time required for cooking compensates for the higher temperatures used. Baking vegetables also ensures good retention of nutrients, as only a thin outside layer, which becomes hardened or charred, reaches a high temperature. The stone oven used by most native peoples in the Pacific, except where it has been replaced by metal cooking utensils in areas long exposed to European contacts, would be expected to give only small losses of nutrients during the cooking of vegetables.

The size of the pieces which are cooked naturally affects the loss of nutrients by solution in the cooking water. The smaller the pieces, the greater their total surface area and their loss of nutrients in given conditions of cooking. Mashed vegetables lose vitamins very readily, particularly vitamin C, and this is true also of those kept hot after cooking.

The Department of Labour and National Service, Commonwealth of Australia, has interested itself in the losses of nutrients from vegetables cooked on a large scale in factory canteens. Mr. J. E. Excell, formerly of that Department, described at the Canberra meeting of the Australian and New Zealand Association for the Advancement of Science in 1954, an improved method for large-scale vegetable cooking. This method used a steam table with several pressure-cooker pots, allowing small batches to be cooked and served as required. The steam table consists of a shallow, flat-topped metal box in which steam is generated. The steam is supplied through a tube for each pressure cooker. A timer is provided to control the time of cooking, and a valve to release the pressure when cooking is completed. The cost of this equipment was stated to be small compared with that of a conventional large-scale pressure steamer of equivalent capacity. The cooker pots weighed about 10 lbs. each and the steam table about 25 lbs., the equipment being readily transportable. The experimental equipment was electrically heated, but it should be possible to substitute other means of heating in places where electricity is unavailable or unduly expensive. The electricity used was estimated at 1 k.w.h. per 20 lbs. of vegetables cooked.

In many institutions (e.g., hospitals, boarding schools, police barracks), where cooked meals are supplied, such equipment should increase the nutritive value of the food when eaten—the only stage when the nutritive value really matters. Initial and running costs of the equipment are likely to be less than with similar installations now in use.

It is to be hoped that this equipment will be produced commercially in Australia; in the meantime the South Pacific Commission can supply by permission of the Department of Labour and National Service drawings showing the assembly of the working unit.

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Cocoa of excellent quality is produced in Papua and New Guinea, where there are large areas of land suitable for this crop. Although only a very young industry there, cocoa production is steadily expanding, and already ranks fourth on the export returns. Here, plantation hands are shown breaking cocoa pods for extraction of the beans, which then go into fermenting boxes for about a week, thence to sun-drying trays, and finally to a hot-air drier

An abstract of an article by R. V. Wadsworth in TROPICAL AGRICULTURE *for January, 1955, prepared by . . .*

E. J. E. LEFORT*

The Quality Of Raw Cocoa As It Affects The Manufacturer

THE well-advanced research at present under way on the cocoa tree should not only be directed towards increasing productivity but also to improving quality. The latter subject has been dealt with by Mr. R. V. Wadsworth in an article published in the January 1955 issue of *Tropical Agriculture*. In view of the high qualifications of the author, who is chief chemist with the firm of Cadbury Brothers Limited, it was felt that a summary of his analysis would prove of interest to readers.

Industry extracts four distinct products from cocoa: drinking cocoa, eating chocolate, cocoa butter and theobromine.

It is clear that the ideal cocoa bean in relation to each of these uses has a good flavour, a high percentage of fat, and a high alkaloid content. The latter is not, however, indispensable since theobromine can at present be extracted from waste products, more particularly from the shell of the bean.

Research has not yet shown the exact origin of the flavour. We do know, however, that fermentation is of vital importance in its development.

Since 1939, the quality of cocoa has fallen in many areas. This is not the result of varietal changes in the tree population, which evolve only very slowly, but is connected rather with inadequate preparation of the beans. To obtain a standard commercial quality of cocoa, adequately controlled methods are essential.

What are the difficulties produced by the various defects originating in inadequate preparation of the bean and the effects on the manufactured product?

Unfermented Cocoa: These are beans which have been little more than dried in the sun as soon as they are removed from the pod, and are known in the trade as "slaty" beans. Their appearance is generally a slate-grey. Under a low-powered magnifying glass a cut surface of the bean appears mottled, with dark spots of undistributed colour. The texture of the cotyledon is leathery and the cotyledons are closely packed together.

This defect may also be due to the practice of adding to the fermenting heaps, beans taken from odd pods which are not sufficient in quantity to ferment by themselves. Such beans added on the last day of fermentation find themselves on the drying trays within 24 hours of the pod being opened, and thus have no fermentation at all. The practice of adding fresh beans to heaps already in the course of fermentation, at whatever stage this occurs, has a bad effect on the product.

Unfermented beans do not produce a chocolate flavour on roasting.

The shell in unfermented beans adheres closely to the cotyledons and in the winnowing process is most difficult to separate. Much of the shell finds its way into the nib clinging tightly to its surface. The leathery texture of the unfermented beans causes a marked reduction in the output of the grinding machines. The release of the fat from the cells being incomplete, more cocoa butter is necessary to get the same fluidity for factory handling.

However, the most important defect is the lack of chocolate character and the objectionable nature of the flavour developed by roasting. The colour of chocolate from unfermented beans is a blue-grey rather than a chocolate brown. The flavour is bitter and astringent, roughening and drying the palate. Not even small quantities can be used without affecting considerably the quality of the product.

Their only use, therefore, is for the extraction of cocoa butter and the manufacture of theobromine.

Purple Beans: Purple beans indicate that the temperature of the fermenting heap has, in the early stages, been too high, or, in the later stages, too low. These variations produce bitterness, or floral and liquorice flavours.

Roasting will affect the purple colour considerably, but does little to improve the flavour of the chocolate. This, accompanied by the various flavour characters mentioned above, prevents manufacturers from developing the standard chocolates for which their names stand. Thus, the variety of flavours produced makes this defect a difficult and objectionable one.

Germinated Beans: There is little information on the effect of germination on flavour. What little is known tends to suggest that the beans are mild in flavour, lacking good chocolate character.

Mouldy Beans: Moulds inside the bean increase the free fatty acid content of

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the cocoa butter and can make refining of the fat essential before it can be used.

It is frequently overlooked that mould development in the bean can increase the liability of the manufactured goods to develop moulds under poor storage conditions.

Although fermenting heaps always contain moulds, these rarely affect the flavour or enter the shell. Poor flavour is closely connected with the development of mould inside the bean. This is generally encouraged by unduly prolonged drying or by storing in unsuitable places, especially in the tropics. Atmospheric humidities of over 80% and beans with a moisture content of 8% or over will cause mould to grow. Storage in hot, damp areas should be avoided as far as possible.

Pod Diseases: Certain diseases attack the sweet pulp surrounding the seeds and live on the sugar in which the fermenting organisms grow. Thus, such beans added to a fermenting heap do not add anything but bulk, and consequently reduce the temperature. This defect of processing is conducive to the production of purple beans whose disadvantages are already known.

It is obvious that in these conditions mould develops rapidly, giving rise to the host of drawbacks enumerated in the previous section.

Broken Beans and Infestation: In some countries, beans are washed to such an extent that the shell is made thin and brittle. Under such conditions, much of the cocoa is broken down during handling and carriage. Roasting can only be carried out on beans of a reasonably equal size and even roasting of broken nibs is not always possible. Therefore, the broken section of a consignment has a considerably reduced commercial value.

Broken beans are also responsible for the maintenance of the population of insects in a cocoa sack.

Shell Percentage: Shell is purely a by-product to the manufacturer. It contains only 1% of theobromine, which does not make it worth extracting; on the other hand, this is too great to be ignored in animal feeds, although shell has been successfully used as an accessory fodder on account of its vitamin D content.

Shell has therefore practically no commercial value, and its only useful function appears to be protection of the nib. The percentage of shell on a bean is an economic consideration in the purchase of cocoa and everything should be done to reduce it to the minimum.

The shell content of beans varies greatly; it is at 8% in Samoa or Ceylon, 11 to 12% in West African cocoas, 14% in Trinidad, and sometimes as high as 16% in South America. The bean straight from the pod has a shell percentage of approximately 10% but this percentage increases during processing by about 3%; firstly, because of the micro-organisms which form on the shell during drying (2%), and also from dust and earth picked up from the drying floors (1%). The practice of claying the beans, which was once common in the New World, can add as much as 3% to the shells.

There is still much to learn as to how much inheritance is responsible for variations in the thickness and weight of the shell. The whole problem, in fact, of shell on cocoa beans still awaits full investigation.

Bean Size: Both the shell percentage and the fat content of cocoa are influenced by the size of the bean. Generally, when the prepared bean weighs over 1 gram, the difference in these characters is small, but when the size falls below 1 gram, the increase in shell content and the fall in fat percentage can be considerable. With West African cocoa, it has been found that where the size of the bean is over 1 gram, the shell percentage remains constant within 1%. Where, however, the weight of the bean falls below one gram, the average rise in shell percentage is up to 3%.

The effect of size on the fat content of the nib has been determined. Beans weighing over 1 gram vary little amongst themselves, whilst those which weigh less than 1 gram vary considerably. The average fat percentage of the smaller beans is in the order of 3% less than that of the heavier beans. There is, therefore, a definite preference for heavier beans since high fat content is a most desirable quality.

Absorption of Extraneous Flavours: Prepared beans readily absorb foreign odours and those which are fat soluble are tenaciously held. The most common defect from this cause is the absorption of smoke where open fires are used for drying.

Artificial drying seldom causes this trouble, since smoke leaks are easily detected. Cocoa, once contaminated with smoke, is ruined for edible purposes. Butter can be extracted from it, but expensive refining and deodorizing must be resorted to in order to make an edible product.

Conclusions

The manufacture of cocoa and chocolate requires a cocoa bean which has:

1. A brown colour and produces a good, strong chocolate flavour on roasting; in other words, has been well prepared.
2. The lightest shell percentage compatible with protecting cotyledons from breakage; this, as suggested, should be 10%.
3. A high fat content in the cotyledon. Here it is suggested that 60% should be the minimum aimed at by the plant breeder.

There is no need to emphasize that constancy in these factors is a most desirable quality.

On the negative side, the manufacturer asks that the beans he purchases are free from:

(a) mouldy beans;
(b) unfermented or slaty beans;
(c) inadequately prepared beans with their varying colours and flavours; purple beans;
(d) beans which have picked up foreign flavours, especially "smoky" ones;
(e) germinated beans;
(f) broken or damaged beans;
(g) shrivelled or flat beans.

Tropical Agriculture—The Journal of the Imperial College of Tropical Agriculture, Vol. 32, No. 1, January 1955.

Cash Crops and Imported Food

(Continued from page 26)

plenty of good quality protein.

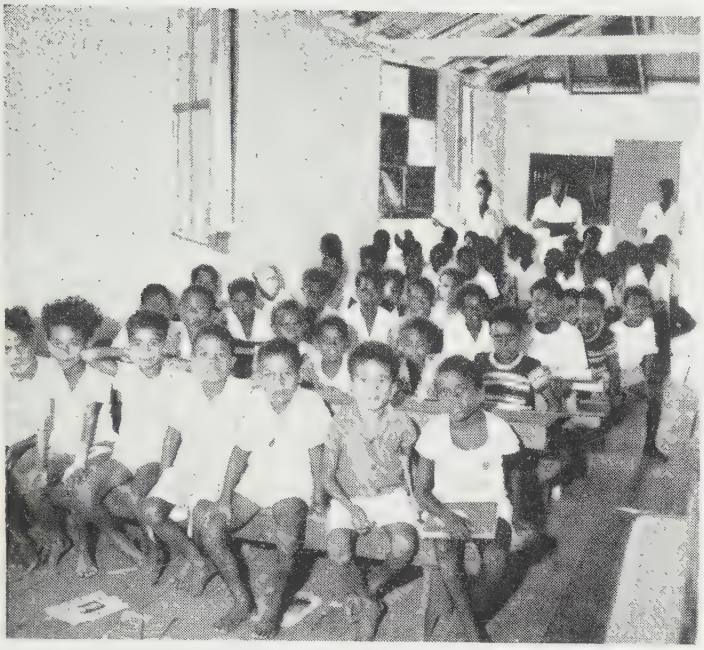
The nutrition of people growing cash crops on an extensive scale will need careful watching. At the present time in most territories, dietary deficiencies are probably most frequent among people who are employed in towns and not provided with rations. They often have special difficulties in buying and cooking food, but the basic trouble is a tendency to rely on foods of low nutritive value, and in some places to save excessively on food in order to buy other goods. Similar problems could occur in communities placing undue emphasis on cash crops.

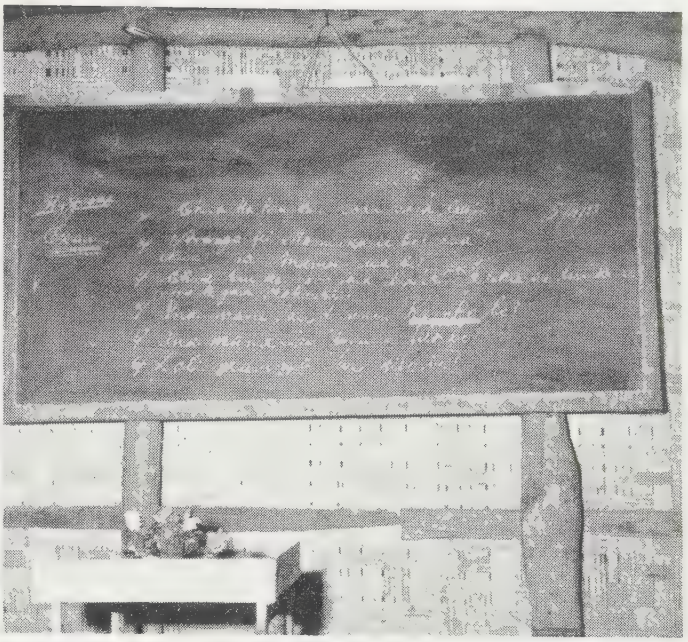
On the other hand, real benefits, besides the actual money income, may be expected from growing cash crops. The natives will acquire a knowledge of marketing and handling techniques and probably also of the management of co-operative enterprises. Crops grown at first only for sale may enter and improve the native diet, as with peanuts in some parts of New Guinea. Cocoa also has become a useful minor item of the diet in Western Samoa.

Investigations should be carried out from time to time on the diets of the people specializing in growing cash crops, with particular emphasis on changes which may occur through a switch from garden produce to bought foods, especially imported foods, as the mainstay of the diet.

Bread seems to be popular with natives wherever it is available and consideration should be given to the use of enriched flour in the island territories. This would remove the main vitamin deficiencies resulting from the replacement of garden foods by bread. Enriched bread would, on balance, improve the diet by increasing the protein supply without decreasing the vitamins, as happens with ordinary white flour.

Similarly, in areas where rice is widely used, steps should be taken to ensure that it is supplied in a nutritious form, whether by light milling, by parboiling or by enrichment.





Left: A class in progress at the school of the Presbyterian Mission, Mele Village, New Hebrides. Right: Questions for an examination on hygiene.

International Seminar On Health Education

A seminar on health education and nutrition was held under the joint auspices of the Food and Agriculture Organization and the World Health Organization at Baguio, Philippine Islands, from 13th October to 3rd November last. Some items of interest discussed are reported below by the Commission's observer to the Seminar . . .

GUY LOISON*

AT its fourteenth session held at Nouméa in October-November last, the South Pacific Commission resolved that its health education programme should continue. In particular, it agreed that a pilot project should be initiated in a New Hebrides village where I had spent a week the previous April. My mission there was to conduct a preliminary survey in order to decide whether this village combined the optimum conditions for successful implementation of a project intended to serve as a means of evaluating different techniques in health education, experimenting with audio visual aids, and defining the respective responsibilities of the population, missionary organizations and administrative departments (education, agriculture, health, etc.) in a community education campaign.

One of those attending the Baguio Seminar was Dr. Charles Lemaigre, Director of Health in the New Hebrides Condominium, who agreed to supervise this pilot project, which is to be carried out by the villagers with the Commission's technical advice.

After the Seminar, I had a conversation at Nouméa with Dr. Lemaigre, who was returning to the New Hebrides. I noted some of his impressions and shall present them here. Comparing them with those I contributed to the *Bulletin* for April 1955 on the subject of the Canberra Symposium, readers will find many points of similarity. This is indeed proof that health education rests on a universal and scientific basis, and belongs to all latitudes.

* * *

The South Pacific territories were well represented at Baguio. Looking down a list of the seventy people attending, representing twenty countries (mainly from South and South-East Asia and the Western Pacific), readers would notice in passing a number of familiar names: Dr. J. Gunther and Dr. J. Refshauge (Papua and New Guinea), Miss Mary Murai (who has published a study on nutrition in Micronesia), Mr. P. Merkelijn (who has contributed on Netherlands New Guinea to the *Bulletin*), Dr. F. W. Clements and Miss K. Gordon (the successful instigators of the Canberra Symposium), Mr. L. Keyes and Miss V. Drenckhen, Regional Advisers. Professor Freedman, the social anthropologist, had come from London.

The United Nations Food and Agriculture Organization in Rome sent Miss J. Ritchie from the Nutrition Division. Finally, from Geneva came Miss H. Martikainen, head of Health Education, and Dr. R. C. Burgess, head of the Nutrition Section of the World Health Organization.

During the three weeks of discussions, conferences and demonstrations, doctors, educators, nutritionists, sociologists, social anthropologists, public health experts, agriculturists, etc., had ample time to become acquainted, to exchange opinions and experiences, to compare methods, modify their opinions or confirm their successes, and, in every case, to evaluate the vast amount of work still remaining to be done.

Three days were devoted to visiting the villages. Delegates were able to witness the effort being made by the Republic of the Philippines in the field of health education, and particularly in improving food conditions.

* Dr. Loison is Research Officer for Health to the South Pacific Commission.

Aim of Seminar

The precise aim of this Seminar was to apply the general principles of health education to nutritional problems, adapting them to local conditions in the territories. The following may be noted among the subjects to which the delegates gave their attention: means of eradicating superstitions unfavourable to a rational diet; teaching programmes intended for future educators and school children and the relations existing between such programmes and the problems facing health departments.

All agreed that village education should be more intensive. Some participants posed some very relevant questions on possible ways of changing bad food habits, on education applied to enriched rice consumption, on the danger of providing yet further breeding places for *anopheles* by establishing ponds for fish farming, on the means of combating the harmful influence of some older persons firmly attached to out-dated practices, and on the difficulties frequently encountered in overcoming family resistance to the new ideas brought home by school children.

Throughout the days of study, the experts present were also called upon by delegates at frequent intervals to explain certain points. For instance, Professor Freedman put forward some views which it is felt might be usefully recalled. In a given community we know that the social structure (clan, tribe, family, etc.) exerts direct influence on child care, or agricultural methods, or arrangements for meals, etc. Further, to educate means effecting a change. Thus, if one attempts to limit educational activity to the advisability of a particular diet, without realizing or deliberately ignoring the inevitable relations involved, the programme is doomed to disaster.

In New Caledonia, the past few years have witnessed the breakdown of the traditional pattern of native society. As the authority of the chief grows weaker, the men are gradually leaving the village to seek work elsewhere. Their diet is changed abruptly. The women who have remained in the villages are faced with an increased number of tasks and are obliged to change their methods of infant feeding. These are problems comparable to those experienced in Europe in the course of the great revolutions in its social history.

I shall mention a further example; in this case, the economic future of a country is primarily at stake. The population of Tahiti is steadily growing. A great part of the agricultural land is used for producing bulky, high-calorie foods (taros, yams, bananas) with a very low market and nutritive value. Would it not be preferable to import a certain proportion of these requirements in the form of rice and flour and to devote the recovered land to producing protein foodstuffs (such as meat and milk) which have long since been imported at great cost?

The general store in the village of Mele in the New Hebrides.

Inadequacy of proteins, vitamins and calcium, particularly in the diet of the expectant or nursing mother and that of the child during weaning, is a question whose importance in the area is so great that it could hardly fail to be among the subjects discussed by the delegates of Baguio. How can diets be improved? How can acceptance of the new foods introduced be encouraged?

Malnutrition Result Of Ignorance Rather Than Poverty

Poverty is rarely the cause of malnutrition in the South Pacific. Ignorance is the main culprit. Admittedly it is a good thing that, as is the case, breast-milk should be available to the child up to the age of one year; but long before this age, when the child is from five to six months old, its mother should realize the need for additional foods (dairy products, eggs, fish, fruit, cereals, etc.) and should know the best ways of preparing them.

While on this subject, I asked Dr Lemaigre what were the results of discussions in his particular group and how far these results were applicable to the New Hebrides. My questions, and his answers, are recorded below:

Dr. Lemaigre, do you not feel that the European cooking methods have sometimes aggravated a situation where balance had been attained, and that the educator will often be required to prescribe a return to ancestral methods?

As in all cases my reply here is: Let us first consider present local conditions. In the New Hebrides, for instance, two cooking methods are used: cooking on heated stones (which conserves most of the nutritive elements), and cooking in water (which removes a large part of the mineral salts and vitamins). Is the former only to be recommended although it requires time and effort? No, for one notices that the cooking water is subsequently absorbed as a beverage or soup!

In the New Hebrides, the traditional diet of the expectant mother includes very few proteins. She is entitled only to a bare minimum of meat and fish. Poultry and game are forbidden. The nursing mother eats no meat at all until the infant has reached the age of 10 months. What do you intend to do in order to combat such prejudices?

These taboos, whose distant origins are unknown to us, should only be attacked with a great deal of caution. I believe the personality of the educator will count a lot in this branch of activity. The audio-visual material used for this purpose should be very tactfully presented.

How do you intend to encourage the population to utilize new foods rich in protein?

Before undertaking anything on a large scale, we must be certain that all these foods will be popular. Trials should, therefore, be made in the schools and villages, varying the methods of preparation. Naturally, we shall first contact the departments of Agriculture and Stock to discover whether local production will be able to satisfy the new requirements and to what extent it can be developed if necessary. The rest will be a matter of education.

Is the educational material prepared by the South Pacific Commission suitable

Left: Preparation of "lap lap"—taros, meat and coconut cream wrapped in leaves. Right: Bundles of "lap lap" in the earth oven.

for the programme you undoubtedly intend to lay before your administration on returning to Vila?

It is, indeed, perfectly adapted to local conditions and I shall most probably need to call upon your services in the near future.

Could you indicate the broad outlines of the programme you have in mind?

For the time being, it can be summed up under a few headings:

Instructions to administrative personnel (health, education, agriculture), missionary personnel, and village leaders;
establishment of public health teams in the communities;
education of the peoples by all means that can be utilized in the group, with emphasis on instruction in the schools;
assistance from specialized organizations, such as the World Health Organization, the Food and Agriculture Organization, and the South Pacific Commission.

In this connection, the interest shown by the Commission in the pilot project envisaged in Mélé Village, near Vila, gives me great pleasure since, before requesting the Administration of the Condominium to finance a large-scale undertaking, it is preferable to attempt a few limited demonstrations with extremely simple methods. It will always be possible later on to widen the scope of our activities when the population has realized the benefit it may derive from an educational campaign.

* * *

I agree with Dr. Lemaigre that we have reason to rejoice at the Commission's decision. The village of Mélé seems the ideal choice for a demonstration centre. It is situated a few miles from Vila and the 600 inhabitants, who are most amenable to progress, are administered by their chief, Mr. Kalsautu, who represented the New Hebrides at the Second South Pacific Conference. The population, missions and administrations are anxious to proceed with the programme. Later on, it will be possible for those delegated by their own villages as health educators to come there for training.

This programme, to be included in community development, will provide the opportunity for in-the-field application of the theoretical data already available. The information on food education supplied by the Baguio Seminar will certainly be of very great use.

As Professor Freedman said: "Posters urging people to drink milk or not to spit have a real effect in some places and none at all in others. Trial and error is necessary. Several methods should be tried out and their effectiveness evaluated with honesty."

The project which the Commission is about to undertake will certainly have repercussions outside the limits of the Condominium. From the nutritional viewpoint there is already an extensive body of information concerning this village. It will be remembered that Miss Malcolm, the Commission dietician, published a report on the research which she carried out there in 1951.* I visited Mélé, accompanying the men to their plantations, watching the children making their purchases in the village shop, observing the women preparing "lap lap", sharing the family meal. Visits were paid to possible educators, both official and unofficial. It now remains to select the methods to be used and to decide on those which must be avoided at all cost.

The Baguio Seminar made certain principles quite clear: not to attempt to attain perfection rapidly; to experiment first of all on a modest scale; to make constant reference to practical results before undertaking the next step; not to speak too much; not to impose one's own organization; not to give an outside officer too much responsibility; to encourage the people to take an active part in the preliminary investigation and implementation of the project; to ensure that agricultural and economic development proceed at the same pace as the campaign aimed at improving nutrition

Team work is essential in the village and also at a higher level (Directors of Health, Education and Agriculture Departments; there seems to be no difficulty here, since educational activity is part of the daily work of these persons). Further, often within the village there exist conflicting influences which the educator should take into account when engaging his assistants.

One of the forms of co-operation from the village people which has often been suggested is that the people themselves should share in the cost of the campaign. If, for instance, posters and illustrated pamphlets are paid for by the community, it will set greater store on them, not only from the material, but also from

* Sheila Malcolm: *Nutrition Research Conducted in New Hebrides During 1951* (South Pacific Commission, Technical Paper No. 23, April, 1952).

the educational viewpoint. Furthermore, better care will be taken of such material than if it were distributed free of charge by the administration.

School Visits By Delegates

The prime importance of instruction in the schools was unanimously recognized. After visiting several infant classes the delegates were asked to give their impressions. They had noted the personal influence of one schoolmistress and the kind of competition in bodily cleanliness which the pupils had organized to please her. They wanted to know how they might obtain some of the visual aids, which they considered excellent.

One class was taken out to the village well and given a lesson on drinking water, cleanliness and waste matter. On their return to the school, the pupils were given the task, in the hand-work class, of constructing a model well in miniature. There is no doubt that this model will serve as a basis for future construction of new wells in Philippine villages.

At the school canteen the delegates saw a meal being prepared for which the menu had been composed by the girls, who were also responsible for making the necessary purchases at the village market. Vegetables were provided from a garden tended by the boys as part of their agricultural training. These children will certainly derive excellent food habits from these practical experiments, and are not likely to forget them.

Education in mothercraft was naturally brought up for discussion, together with the rôle of staff in maternal and infant welfare departments. Personnel for this work is unfortunately only too limited in the territories, confirming the Chinese proverb: "What I practise, I know", but also the adverse: "What I know, I do not necessarily practise".

A woman delegate told how in her territory, some of the mothers know by heart the correct replies to the questions asked them by the doctors and nurses on the subject of food composition; but the monthly weighing of their infants unfortunately revealed that they did not apply the advice they had so carefully remembered.

* * *

The general principles in evaluating educational campaigns were re-stated. They are too well-known to need repeating here.

An interesting result has been obtained in the Philippines through the Centre for Demonstration and Training in Rural Hygiene, which is assisted by the World Health Organization and the United Nations International Children's Emergency Fund. Within the experimental area, the attitude of the population has grown more progressive, the number of latrines is higher, intestinal parasitism is on the decrease, and it is becoming increasingly rare among babies brought for consultation to find signs of malnutrition and vitamin deficiency.

Another consequence has been the population's present practice of considering other problems, too, on a communal basis. The villages have requested advice from agronomists and sanitary engineers. Classes for adults have been established. An entirely new programme of technical and professional education had to be drawn up by the local councils as the inhabitants became conscious of community life.

Within the Health Education and Nutrition programme, the Demonstration Centre has been faced with the task of training an ever-increasing number of educators. Fully aware of their rôle and the responsibilities imposed upon them, doctors, nurses, midwives, dentists, school-teachers, public health officials, etc., have come for further training with the Centre's specialists.

It is on this subject of the training of educators that I shall conclude these few items of interest. The Baguio Seminar provided an opportunity for recalling a few truths:

To make a good health educator, it is not enough to be thoroughly conversant with the subjects, but certain qualities and aptitudes are also necessary in order to communicate both knowledge and enthusiam to others. Practical training is indispensable.

Excellent educators can be found elsewhere than in the ranks of the administration.

Admittedly, voluntary organizations can contribute substantially to the administration's task but the government must support their efforts in accordance with the aims it has set.

The task entrusted to educators should be in keeping with their educational level. Those who have received only brief basic training should be supervised in their daily work. Refresher courses should always be planned.

Qualities of a Good Educator

The qualities expected of a good educator were described thus: the desire to continue to learn, a sincere interest in the work in hand, understanding of human relations, resourcefulness, initiative. He is also expected, of course, to be capable of assimilating methods and techniques and of co-operating with others, but the chief requirement is thorough knowledge of a field which is tending to grow more and more limited even to the point of forming health educators specialized in certain branches and for certain clearly-defined tasks.

We have not yet reached this point in the territories of the South Pacific. However, the administrations are becoming more and more interested in health education, and the peoples themselves, too, as is evidenced by the resolutions of the Second South Pacific Conference. The Commission's decision to organize, in 1957, a course for health educators of local origin selected from among the personnel in Education and Public Health departments in the territories should therefore be commended.

When the time comes, we shall keep readers informed of developments in this interesting new scheme.

BOOK REVIEW . . . Fruits of Hawaii

FRUITS OF HAWAII, Carey D. Miller, Katherine Bazore and Mary Bartow, ix + 197 pp. University of Hawaii Press, 1955.

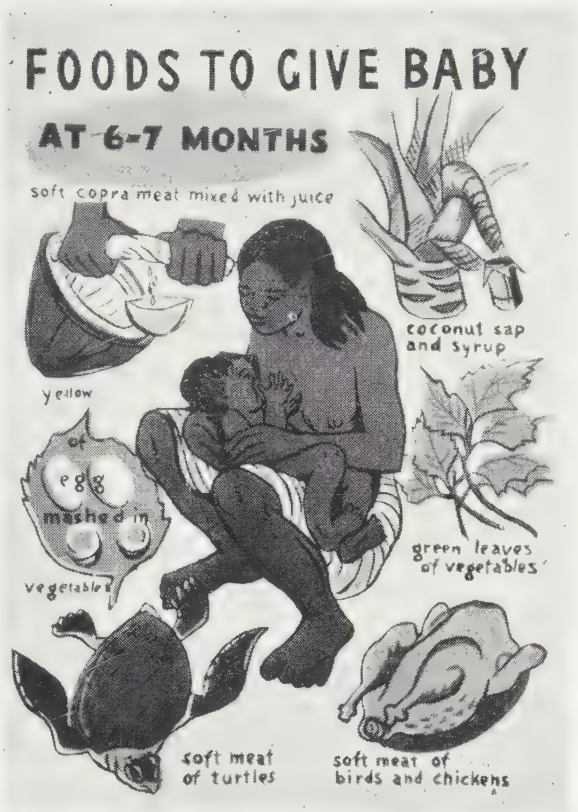
MOST of the Pacific Islands are capable of growing a wide variety of fruits. A few fruits seem to be native to the islands, but most of those now grown were introduced from other parts of the world, some before European penetration, and many later.

Local fruits, in spite of the wide range now grown, play a surprising small part in the diet of the average European resident in the islands, and in many territories are used less than overseas fruits imported in cases or in refrigerated storage. There are various reasons for this paradoxical state of affairs. Some local fruits are available only for a short season each year; others reach the market irregularly or in poor condition; retail prices are often high. Another important reason, however, is that these fruits, and the best ways of preparing attractive dishes from them, are unfamiliar to many housewives living in the islands. The publication of a book on the fruits of Hawaii is therefore very welcome. It should be useful far beyond the territory for which it is primarily written.

The book is mainly concerned with ways of using in the home fruits grown in Hawai. Botanical aspects of the subject are mentioned very briefly, and there are interesting notes on the introduction of some species into Hawaii. As might be expected in a book of which Professor Miller is the senior author, the nutritive value of each fruit is considered carefully and in some detail. The data presented show that all the fruits contain measurable amounts of various vitamins and minerals. Fruits are most valuable as sources of vitamin C though they vary greatly in their content of this vitamin. Papaya and guava are superior to citrus fruits as sources of vitamin C. Some fruits also contain substances which in the body may be converted to vitamin A. Fruit has great value in adding variety, flavour and general attractiveness to the diet.

Some of the fruits considered in this book are familiar throughout the islands;

(Continued on page 35)



Above: The district nurse shows a mother how to wash her children. A scene from the filmstrip "Scabies", made in Western Samoa. Right: A nutrition poster prepared by the South Pacific Commission in collaboration with the Trust Territory of the Pacific Islands and printed on Ponape by the silk screen process.

Visual Aids In The South Pacific

The use of visual aids to education in South Pacific territories is steadily expanding, as is revealed by this brief account of developments in recent years.

By NANCY PHELAN*

THE use of visual aids as a means of instruction in the South Pacific has developed considerably in the last few years. Though the Visual Aids Officer is still asked occasionally when on tour if she is selling spectacles, in general the subject has become a familiar one in the area.

Five years ago, when the South Pacific Commission first became interested in this field, visual education was more or less confined to the use of film and, in a few cases, filmstrips. Now, the territories are all fully aware of the value of the medium and are making use of it in different forms; better still, some of them are now producing their own materials and others are rapidly approaching the state where they will be able to do so.

This development is apparent if only from the South Pacific Commission files. In 1951 requests from the territories were mainly for information about equipment, for the loan of films, for lists of materials, and for news of what was available from other parts of the world. Though these requests continue to come in, in large numbers, the emphasis has gradually changed until now the majority of requests are for help in local productions, in obtaining quotes for metropolitan poster or filmstrip printing, or for the use of the Commission services in titling and processing strips made in and by the territories themselves.

The Fiji Public Relations Office has long had an excellent poster printing department, where first-rate work is done with silk screen, but now other island groups are beginning to establish such services.

The Trust Territory of the Pacific Islands under United States administration has installed a silk screen outfit at Ponape, where already posters are being printed with considerable skill. An accompanying illustration shows one of a series on infant nutrition—the result of collaboration between the Trust Territory and the Visual Aids Officer, who arranged for the posters to be drawn by a Sydney artist specially for silk screen printing. These designs were sent to Ponape, where stencils were made and the posters printed. The results are very satisfactory and should serve as an encouragement to other territories to further their experiments in printing.

Most islands headquarters now possess silk screen equipment, and in some cases artists and printers can be found locally. Pioneer experiments in this work were made in Apia recently with the Public Health Department, and a poster on scabies was worked out and printed against considerable technical odds. Rarotonga has recently sent in a locally-designed and printed poster. In time all territories should be able to print their own posters.

In continuation of the collaboration between territories and Commission, posters have been prepared on co-operatives for the Gilbert and Ellice Islands Colony, on tuberculosis and fly control for Western Samoa, and on tuberculosis for the Cook Island Administration. In each case, after discussion with the territorial authorities, the Visual Aids Officer has submitted designs prepared in Sydney by artists working for the Commission; these are amended by the territories and local language texts supplied. Arrangements are then made for reproduction (usually by multilith) to

(Continued on page 42)

* Visual Aids Officer, South Pacific Commission.

Samoan islanders preparing "taufolo ulu", a traditional dish made of mashed breadfruit mixed with coconut cream.

A Survey Of . . .

Subsistence Problems In The South Pacific

The widely-varying impact of the European on the subsistence agriculture and the food habits of island peoples in different parts of the Pacific is examined in the article below. The authors consider closest co-operation is essential between the agronomist and the nutritionist in selecting from many traditional and introduced subsistence plants those most likely to maintain a balanced diet.

By EMILE MASSAL and JACQUES BARRAU*

THE ten thousand or so islands scattered throughout the area that early navigators called the South Seas form a world apart, with diverse geographic, sociological and economic aspects.

There is a tremendous contrast between the highland valleys overhung with snow-covered peaks and the vast swamps in the low-lying plains of New Guinea; the tropical forest of continental islands in Melanesia, the Micronesian atoll with its dazzling white coral beaches and the jagged relief of the volcanic islands of Polynesia.

Scarcely a century ago, the staple diet everywhere consisted of products of vegetable origin, and the island peoples devoted the major part of their time to obtaining these foods. Since then, South Pacific peoples have undergone European influence. But this influence is far from uniform in degree. Certain isolated valleys in the heart of New Guinea have yet to be explored. In other islands, social development has been such that, as a result, the islanders have assumed rights and duties originally restricted to Europeans alone.

This development has had profound repercussions on island economy. Admittedly, a number of island groups are still at the stage of subsistence economy. Foraging is still practised in the coastal swamps of New Guinea and the Solomon Islands, in those places where the nature of the soil makes any type of cultivation impossible, or almost so. Elsewhere, unfavourable ecological conditions have forced the islander to develop interesting agricultural techniques adapted either to the limitations of the agricultural land available, or to the poor quality of the soil.

Along with money, Europeans introduced the concept of cash economy: payment for work and the products of the land, and access to imported goods. In the more advanced islands, the development of cash crops has resulted in a decline in traditional subsistence crops, and even, in some cases, in their total neglect. Wages supplement the income derived from sale of copra, coffee, cocoa, etc., and make it possible to purchase imported foodstuffs.

In certain territories, European influence, although present and continuous over a long period, has only slightly modified the ancestral type of subsistence which is maintained by solid traditions and deeply-rooted food habits.

In the majority of islands, however, at the present time, a mixed type of economy, consisting of staple foods supplemented with imported products, is most usual. The proportion between local and imported foods in the diet varies in relation to a number of factors, both social (population movements to the towns, for instance), and economic (selling prices of products, development of trade circuits).

* * *

The European living in the islands of the South Pacific has remained very closely attached to his food habits. His activities lead him to take more interest in cash crops than in the subsistence crops of the natives. Only a few specialists have undertaken the study of the types of subsistence of island populations. The European, although he may have inhabited the islands for a lengthy period, often remains unaware of the possibilties offered by local foods. Lack of information on the subject causes him to overlook the value of foods, even in villages quite close to his place of residence. Apart from imported foodstuffs, the European has introduced a whole series of food plants into the islands. Originally reserved for his own table, the use of these foods has extended in varying

* Dr. Massal is Executive Officer for Health, and Mr. Barrau, Subsistence Agriculture Officer, to the South Pacific Commission.

degrees. For instance, market gardens are found today in the neighbourhood of towns, and supply the urban population; there is an increasing tendency in the village gardens to find introduced plants growing alongside traditional crops.

As much from the social as economic viewpoint, it would be regrettable to neglect this important aspect of the life of South Pacific islanders. The planned regulation of local food production, of diet and volume of food imports, require detailed knowledge of systems practised for obtaining and producing foodstuffs, rates of consumption, and actual, essential means as compared with superfluous requirements.

From the nutritional angle, methods of preparation and preservation are extremely important. Producing or purchasing foods requires either laborious effort or money laboriously earned. It is, therefore, essential to avoid all loss or waste entailed by inadequate methods of preservation, harmful industrial processing or irrational cooking methods.

The substances most essential to man are often the most vulnerable; their destruction considerably reduces the biological value of the food. In this respect, traditional native methods of cooking in the oven of hot stones or on the embers retain the greater part of the nutritive substances. Cooking in water, practised in places where pottery was known, is an acceptable method, in view of the fact that the cooking water is almost always consumed afterwards.

From the European, the islander has borrowed cooking utensils (saucepans, frying pan, kettle) and some cooking methods, of which the most adverse is certainly frying.

* * *

A few examples will give a clearer picture of the wide diversity of problems at present facing agronomists and nutritionists in the South Pacific islands.

In the highland valleys of central New Guinea, which are often swampy, the native subsistence economy is based on horticulture comprising remarkable techniques: sweet potato, the staple food, is grown in drained gardens. The pandan, with edible, oily seeds, supplies an appreciable supplement to the diet. The same is true of a number of fresh vegetables, either grown or gathered wild. Protein foods, on the other hand, are more scarce: the pig, which is used rather as currency than as food, makes only an occasional contibution to the diet. Produce obtained from hunting and fishing in lakes and rivers is limited. Salt, moreover, a rare product in these areas which are far distant from the sea, is the object of extremely complicated systems of exchange. It is also partially replaced by ashes of vegetable origin, consisting of potassium, instead of sodium, salts.

Attempts towards improvement in such areas should be primarily concentrated on increasing protein food resources. The first essential is to develop and improve raising of small animals, especially pig-raising. This might be achieved by introducing new strains and by careful cross-breeding with local pigs. Excellent results have already been obtained in this way in a few districts of both Netherlands and Australian New Guinea. The introduction and demonstration of improved stock-raising techniques should also play an important part.

Alongside this attempt, cultivated plants might also be introduced, particularly legumes, which would provide a further addition to protein resources. Introduction of new early varieties of the staple food, sweet potato, with higher yields and increased food value will also provide a marked improvement in food conditions.

On the technical side, however interesting traditional native methods of soil drainage and compost may be, there is nevertheless room for improvement. Here again, agricultural extension work is of prime importance.

In New Caledonia problems are of a different nature. The extension of coffee cultivation for cash on native lands has resulted, in certain tribes, in the decline and modification of subsistence production. This tends increasingly to be based mainly on those food plants which are easy to grow and which will form more or less permanent stands. (This is notably the case of *Xanthosoma* taro, and banana.) The islanders gather their tubers or fruit as required.

In the case of this particular territory, it would seem that subsistence gardening could easily be revived by encouraging the islanders to practise new horticultural methods: soil fertilization, rotation of crops, etc. In this way it would be possible to assure the native population of a better-balanced vegetable diet. As before, extension work is essential.

There are also territories in the South Pacific where the development of cash crops has resulted in a total or almost total disappearance of subsistence agriculture: a typical example is that of the Tuamotus. In the present diet of the inhabitants of this Group, 2,000 calories of the daily, individual ration are supplied from imported foods, purchased with the income obtained from sale of copra. The result, unfortunately, is a lack of balance in the diet. In such a case as this, restoration of subsistence agriculture is quite out of the question. The most that can be expected is to encourage development of family vegetable gardens close to the houses. By this means the islanders will be able to benefit from fresh vegetables and fruit likely to remedy qualitative deficiencies in the diet.

* * *

As a general rule, development of cash crops thus tends towards a reduction in traditional subsistence production—even to its disappearance—in favour of imported foodstuffs. Such a development is inevitable. Its consequences from the nutritional angle are nonetheless regrettable. In fact, the new diet of the "rice or flour—tinned goods" type is far less inferior to the traditional diet. The agronomist and nutritionist should, therefore, work in unison to maintain, establish or restore subsistence production capable of ensuring a balanced diet. Depending on the case, the following might be undertaken:

Either a new agricultural system might be established, including, alongside cash crops, production of staple and supplementary crops;

or, as indicated above, the establishment of small family vegetable gardens and orchards close to the dwelling might be encouraged, the main purpose being to produce fresh, supplementary foods;

or, native market gardening might be developed, with production of tubers, vegetables and traditional fruits to be sold on local markets. By this method the islanders would be able to purchase traditional foods as well as imported goods with the income derived from their cash crops.

Co-operation will be particularly essential between the agronomist and the nutritionist in selecting from among traditional and introduced subsistence plants those which are most likely to maintain a balanced diet.

Book Review

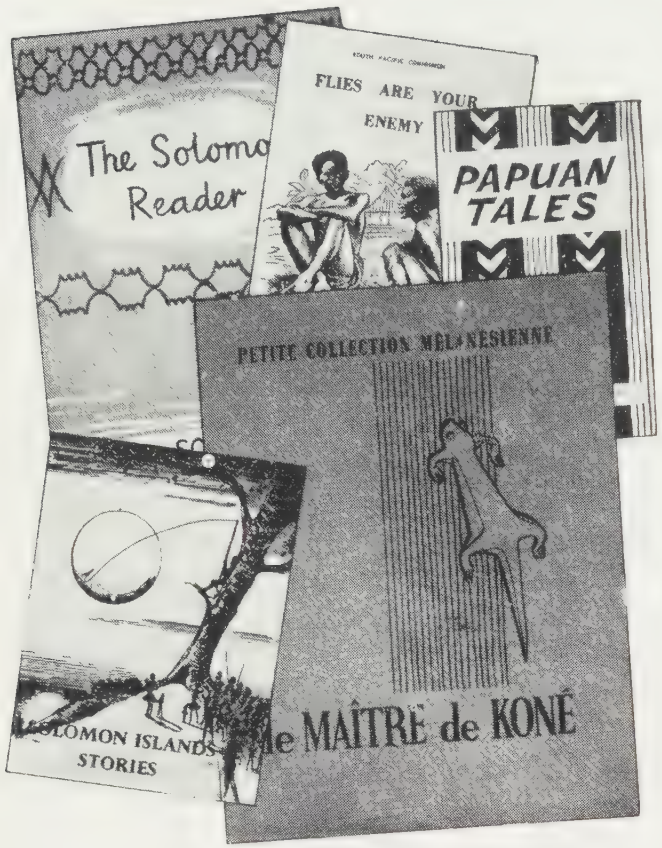
(Continued from page 32)

we may mention banana, breadfruit, coconut, guava, lemon, mango, orange, pawpaw (papaya) and pineapple. Some, such as carambola (*Averrhoa carambola*), carissa (*Carissa grandiflora*) and ketembilla (*Dovyalis hebecarpa*) are less generally known. There are also a few, such as plums and grapes, which can be grown in Hawaii but probably not in most of the island groups nearer the Equator.

For each fruit the authors give a series of recipes, including many new and tempting ways of using the familiar fruits such as banana, mango, coconut and guava. There are also detailed instructions for complete meals in which tropical fruits have an important part. The recipes are practical, and have all been tested by the authors; some may be a little elaborate for a busy housewife, but anyone living in the islands will find much useful information and many new ideas in this book.

It is to be hoped that the authors will provide a companion volume on tropical vegetables. These are on the whole dull compared with tropical fruits, but could be more widely and more attractively used than they are at present.

—H. S. McKee.



Books For The Pacific

The South Pacific Commission Literature Bureau was formed in 1951 to stimulate the production of books and other publications for the island peoples of the area. This article briefly reviews some of the work being carried out by the Bureau, with particular reference to materials produced since its inception.

Left: These attractive booklets were printed by a modern offset duplicating process specially designed for the low-cost production of small editions. Enquiries concerning the production of similar types of booklets would be welcomed by the Literature Bureau. Opposite: An increasing number of new books specially written for islands peoples is now becoming available through the co-operation of the Bureau, territories, and reputable publishing houses.

THE rate of literacy in some of the island groups in the South Pacific is quite high, but there are still large areas —notably New Guinea, the Solomon Islands and the New Hebrides—where few people can read or write.

In all these territories, increased schooling facilities and sometimes literacy campaigns are being used to provide these peoples with the basis of a sound education, but unless there is an adequate supply of suitable literature to consolidate and maintain the newly-literate's ability to read, both schooling and literacy campaigns can lose much of their permanent value. In fact, it has been proved time and time again that the best literacy campaign will quickly fail if there is no provision for literature beyond the primer stage.

Although the production of books was one of the Literature Bureau's main responsibilities from its initiation, it was not the only one; apart from generalities, very little was known of the precise and detailed literature requirements of the South Pacific territories. Therefore, before any book or pamphlet could be printed, it was necessary to find out just what material was needed most urgently, the most effective way of presentation, what were the special difficulties and, perhaps most important of all, how far it was possible to relate the needs of the various island groups, one to another, so that publication of material could become a practical possibility.

The Bureau's work in its early formative years was largely concerned with amassing and collating the answers to questions of this type. This work has now made possible the development of a publication programme designed to benefit the needs of most territories and upon which work is now proceeding. Some of the books completed or near completion under this programme are briefly described below.

WEALTH FROM THE COCONUT. W. V. D. Pieris, published by Ure Smith Pty. Ltd. 32 pp. Illust. stg.2s.6d.

A simple, well-illustrated description of practical methods for the rehabilitation and improvement of existing coconut plantations in the Pacific Islands. Although written mainly for islands people, this book should be of value to all who cultivate the coconut palm. In addition to the English and French editions, translations are available in the Fijian, Pidgin, Maori (Rarotongan), Samoan, Tongan and Malayan languages.

FOOD AND THE WORK IT DOES. Lucy Hamilton, published by Macmillan & Co. 48 pp. Illust. A.3s.

Written by the Dietician of the Department of Health in Papua and New Guinea, this book is a simple guide to better eating for island people, discussing which foods are the best to eat and explaining their role in everyday healthy living.

Simply written and profusely illustrated with excellent line drawings, this book should prove very useful for schools or for work at village level.

THE HIRI. Camilla Wedgwood. *ACROSS NEW GUINEA.* Ivan Champion, published by Longmans, Green & Co. 24 pp. Illust. A.1s.6d. each.

The first two titles in the new *Bonito* series of supplementary readers, intended for stories of a factual and historical nature with an authentic Pacific background.

The Hiri is an authentic account of the old trading expedition made by the Motu people to the Gulf of Papua to exchange their clay pots for sago.

Across New Guinea relates the first crossing of New Guinea from the Fly to the Sepik Rivers by Champion and Karius.

Written in simple English and attractively illustrated with line drawings, these books have been designed for either school or adult readers at about 4th-6th year level of English.

Manuscripts suitable for inclusion in this series, and for the *Coral* and *Pacific Heritage* series which are mentioned later in this article, will be welcomed by the Literature Bureau. They should be written in simple language, avoiding any difficult sentence structures and contain approximately 3,000 words.

THE MAGIC POT. Peter Livingstone, published by J. B. Wolters & Co. pp. 24. Illust. stg.1s.3d.

This traditional fairy tale from the Port Moresby district of Papua is the first title in the new *Coral* series of supplementary readers, intended for fairy

tales, folk lore, and fiction with an authentic Pacific background. It should prove useful as a reader in schools or for adults at about 4th-6th year level of English.

NA DINAU SA DAU VAKAVUNA NA LEQA. Eunice Carpenter, published by Sheldon Press. 18 pp. stg.8d.

A Fijian edition of *Debts Make Difficulties,* originally published in English in the African Home Library series. Intended as a simple guide to the right use of money for people who are not completely accustomed to a money economy, this book should be useful as a supplementary reader in schools as well as for general adult reading.

NA I VOSAVOSA VAKAVITI E SO. Anare K. Raiwalui, published by Oxford University Press. 68 pp. A.4s.

A collection of 160 commonly-used Fijian idioms. The Fijian text is followed by a literal translation in English and then by an explanation in both English and Fijian indicating how the idiom is used. A particularly useful book for those learning Fijian and any Fijian learning English, but of great interest also to anyone interested in island life and languages.

A MOTHERCRAFT BOOK. N. Stead, published by Longmans, Green & Co. 47 pp. Illust. A.5s.

This book has been written for island girls who have a reasonable education. It is well illustrated with clear drawings and diagrams and is suitable to prepare girls for marriage and motherhood or to enable them to pass on to others less fortunate than themselves the information it contains.

In addition to the books already completed, the Bureau has many other manuscripts in varying stages of production. Of these, the following titles are now nearing completion and should be available in the near future.

HEROES FROM FIJI. R. S. Adam, published by Macmillan & Co. 48 pp. Illust. stg.2s.3d.

A collection of stories describing brave deeds by Fijians during recent years. Suitable for general adult reading or for use at about 4th-6th year level of English.

This book is the first title in the new *Pacific Heritage* series of supplementary readers devoted to stories of a biographical nature dealing with records of outstanding Pacific Islanders.

RICE. W. Cottrell Dormer, published by Longmans, Green & Co. 16 pp. Illust. approx stg.2s.6d.

A simply-written but practical account of rice-growing intended mainly for Melanesian areas. Very profusely illustrated and using a technique of presentation designed specially to facilitate vernacular translations and to help the new reader.

PAPUA AND NEW GUINEA IN PICTURES E. P. W. Marriott, published by Macmillan & Co. 96 pp. Illust. approx. stg.4s.

A social studies book suitable for use from 5th-year level of English. Large photographic illustrations on each left-hand page are accompanied by text in simple English on right-hand page.

PLAYS FOR YOUNG PUPILS. Camilla Wedgwood, published by Longmans, Green & Co. 64 pp. approx. stg.2s.6d.

Five plays specially written for use in Pacific schools, which should have wide appeal to pupils.

A RECIPE BOOK FOR PACIFIC ISLANDS. Lucy Hamilton, published by Macmillan & Co. 160 pp. Illust. approx. stg.3s.6d.

A collection of over 500 tested recipes

A wide range of simply-written, well-illustrated health leaflets has been produced for various island administrations. This technique is applicable to most topics.

specially compiled for the islands people by the Dietician, Department of Health in Papua and New Guinea. This book is a logical "follow-on" to the author's *Food and the Work it Does*, and should prove particularly useful in girls' schools and missions.

HOW THE CROCODILE LEARNT TO BITE. G. N. Lansdown, published by Macmillan & Co. pp. 32.

This book contains nine amusing animal stories with a Pacific Islands background. Some of the stories were collected from the village people themselves and previously appeared in *The Papua and New Guinea Villager.* Written in simple English and illustrated with black and white line drawings, this book should prove suitable for both adult and school reading.

Apart from arranging the publication of books, the Bureau has co-operated very closely with various territorial administrations and missions in the production of simple reading matter at their own expense. Much of this material has been printed using modern offset duplicating processes specially designed for the inexpensive production of small editions of booklets and leaflets. Some details of various leaflets and books already produced are given below; in most cases sample copies are available free on request. The Literature Bureau would welcome enquiries from any territorial administration or mission concerning the production of this type of material.

HEALTH LEAFLETS

Five health leaflets—*Tina Protects Her Family, Clean Milk, Milk for Rauna, Clean Water* and *Fruit Juice for Baby*—have been completed in co-operation with the Departments of Health and Education in Papua and New Guinea.

Written in simple English and well illustrated, these leaflets have proved particularly valuable in providing villagers with a simple record on health matters which may be easily forgotten or distorted if only remembered orally.

Sample copies of these leaflets are available on request, or larger quantities may be purchased at the following prices:

**Tina Protects Her Family, Clean Milk, Milk for Rauna.* A.16s.8d. per 100 copies.

Clean Water, Fruit Juice for Baby. £A1.9.0 per 100 copies.

* Also available in French and Malay languages.

HEALTHY MOTHERS AND BABIES SERIES: So far two titles have been produced for the Departments of Health and Education in New Guinea—*The Pregnant Woman* and *Infant and Maternal Welfare Clinics.*

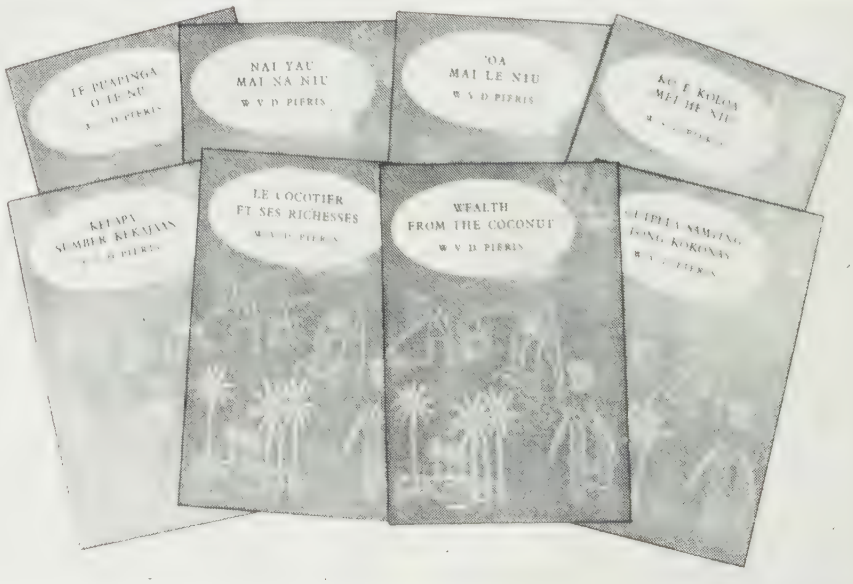
Both are eight-page booklets attractively illustrated with clear line drawings and written in simple English, making them ideal for village level instruction.

Sample copies are available on request, or larger quantities can be purchased at £A1:1:6 per 100 copies.

LE MAITRE DE KONE. A. Barres. Processed by South Pacific Commission Literature Bureau for the Department of Education, Nouméa. New Calédonia. 19 pp. Illust. approx. stg.2s.

An amusing account of the adventures of the village headman of Koné and a large lizard. The present edition is a good example of the way in which local material can be adapted for school and general reading. In this experimental edition, produced by this Bureau using some of the new printing techniques there are three 4-colour illustrations and numerous black and white drawings.

THE SOLOMON READER. M. E. Scrimgeour. Processed by South Pacific Commission Literature Bureau for Melanesian Mission. British Solomon Islands. 24 pp. Illust. approx. stg.2s. (multilithed).



Written to assist islanders to improve their coconut plantations, "Wealth from the Coconut" has been printed in eight languages—English, French, Pidgin, Malay, Fijian, Samoan, Tongan and Maori (Rarotongan).

This little reader was prepared to follow on the earliest introduction of the teaching of reading in English. It is not in any sense a "course", but simply provides attractive supplementary material. There are twenty-four lessons, building up from the reading of single words to the reading of simple sentences, all in the present tense until the last two lessons, when the future tense is introduced. Each lesson is illustrated.

SOLOMON ISLANDS STORIES. Processed by South Pacific Commission Literature Bureau for Office of Information, British Solomon Islands. 32 pp. Illust. stg. 2s.

This book was produced at the specific request of the Information Office and is a good example of low-cost production, using the multilith technique when only a very small edition is required. The text has been typewritten and is illustrated with attractive 2-colour line drawings. There are four stories with a Solomon Islands background and they should be suitable for 10-12-year-old pupils having a reasonable knowledge of English.

A sample copy of this book, together with details of costs, is available on request.

FLIES ARE YOUR ENEMY. South Pacific Commission Literature Bureau. 32 pp. Illust. (multilithed).

An experimental book produced by this Bureau to demonstrate the possibilities and scope of modern low-cost printing techniques for the provision of island reading materials. This 32-page book tells in story form the dangers of fly-infested villages and the benefits that result from ridding villages of flies. Each left-hand page of the book is a full-page illustration and the appropriate text in simple English is printed on the right-hand page. It is intended to assist in meeting the need for follow-up material for new literates and at the same time provide a certain amount of useful instructions.

Single specimen copies and full details of production costs will be supplied on request.

PAPUAN TALES. South Pacific Commission Literature Bureau. 16 pp. Illust. (multilithed).

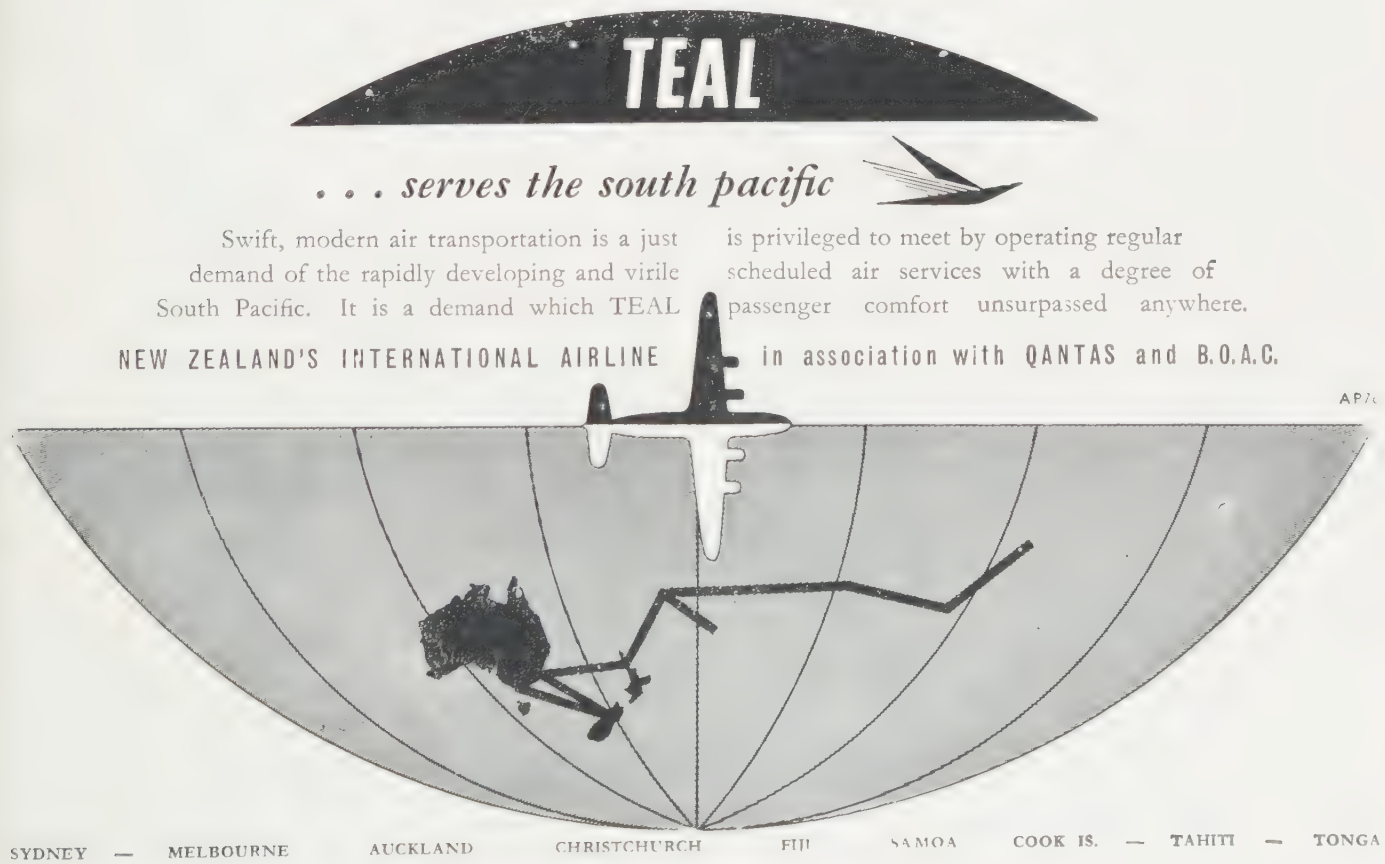
A collection of four stories with a New Guinea background, produced by this Bureau to demonstrate low-cost printing techniques. Each story is illustrated by a different style of drawing to indicate possible artistic treatment—two are printed in colour and the others in black and white.

Although many of the leaflets listed deal with health matters, it should be emphasized that the idea and techniques are applicable to practically any other topic and the Literature Bureau would be glad to provide assistance in preparing this type of material for any territory requesting it. The normal method of working is for the territory to supply the text and rough sketches and instructions as a guide to the illustrations. A layout and roughs are then prepared and returned to the territory for approval; production is commenced only after the roughs are approved and returned by the territory concerned

As well as producing new leaflets, assistance can be given in adapting a present leaflet to suit the particular needs of a territory. This suggestion confirms the opinion held in many quarters that it is often easier to meet local needs by making adaptation to existing materials instead of attempting to produce entirely new materials. Already the health leaflet *Tina Protects Her Family* has been produced in French and Malay versions by simply altering the style of drawings and text to conform with local practices.

PICTURE CREDITS

Acknowledgment is made for photographs in this issue, as follows: Front cover photograph, Netherlands Information Service; pages 8 and 27, Australian Official; pp. 12 and 34, Donald E. Ross, Photographer, Apia, Western Samoa; pp. 13-14-15, Fiji Official.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THIRD SOUTH PACIFIC CONFERENCE
To Open In Fiji On April 23

OVER seventy representatives of eighteen Pacific island territories will assemble at Nasinu, near Suva, Fiji, on April 23 for the opening of the Third South Pacific Conference, which will last until May 3.

The Conference is being organized by the South Pacific Commission, of which it is an auxiliary body. It will be held under the chairmanship of Sir Ronald Garvey, K.C.M.G., K.C.V.O., M.B.E., Governor of Fiji and Senior Commissioner for the United Kingdom to the South Pacific Commission.

Delegates will travel from as far afield as Netherlands New Guinea in the west to French Oceania in the east, and from the Trust Territory of the Pacific Islands north of the equator to the Cook Islands in the south. They will represent more than three million inhabitants of many hundreds of islands and atolls scattered over thirteen million square miles of Pacific ocean.

Observers will be present from various international bodies including the World Health Organization, Food and Agriculture Organization, and the United Nations Educational, Scientific and Cultural Organization, and from universities, research institutions and missionary organizations.

At the meeting delegates will discuss common problems relating to the welfare and progress of their peoples. They will review the past, present and future work of the South Pacific Commission.

Many topics that delegates will discuss relate to the economic development of the region. They include prospects for developing industries in the Pacific, co-operative societies and credit unions, improvement of pastures and livestock, soil conservation, and development of fisheries. Subjects for consideration in the social development field include problems of infant and maternal welfare in the Pacific, and the fostering of indigenous arts, customs and cultures.

From the Conference will emerge recommendations by delegates for further action by the Commission.

Commissioners of the six member governments, who will attend the Conference as observers, will consider these proposals at a special session of the Commission that will be held immediately the Conference ends.

Following the last Conference, which was held at Commission headquarters at Noumea, New Caledonia, in April, 1953, delegates put forward forty-nine suggestions for the further economic and social development of their island territories. At the coming Conference, a progress report on the present state of matters then discussed will be tabled for the consideration of delegates.

First International Coconut Conference

The First International Coconut Conference was convened at Manila on August 26 last, the first anniversary of the formation of PHILCOA (Philippine Coconut Administration).

THE Conference grew out of discussions which had been held between the Ceylon Coconut Board and a PHILCOA mission that had toured the coconut-producing areas of Asia last April. The Conference marked the first time that representatives of the major coconut-producing countries had met to discuss common problems.

Although the Conference was called on relatively short notice, three of the four principal exporting countries—Ceylon, Indonesia and the Philippines—were represented by substantial delegations. (These three countries in 1954 accounted for over 70 per cent of world exports of 1.3 million tons, oil equivalent, copra and coconut oil.)

Malaya, the fourth most important exporter, sent an observer who represented the Singapore Exporters' Association India, third largest coconut producer, but nevertheless a net importer, sent a delegate. Observers were present also from Australia, Belgium, China, Denmark, Italy, Japan, the Netherlands, Thailand, United Kingdom, United States, and from the Economic Commission for Asia and the Far East, the International Labour Office, and the Food and Agriculture Organization.

The Conference agenda was pointed toward discussions of the problems of: (1) developing a co-ordinated research programme among the various countries; (2) standardizing the quality of coconut products; and (3) expanding and stabilizing world markets for coconut products.

The Conference passed resolutions and established committees to work towards all but one of these objectives during the coming year. It was decided that an international coconut marketing agreement to stabilize world markets was not feasible because, among other reasons, there are so many fats and oils that are closely competitive with and substitutional for coconut oil.

The following resolutions were adopted unanimously on the final day of the Conference (August 31st):

(1) That member governments be requested to adopt and enforce a system of grades and standards for copra and other coconut products and to publish them for the information of producing and consuming countries. That member countries be requested to submit pertinent information within three months. This would be collated and annotated and then circulated among member governments.

(2) That member governments be requested to (a) furnish the Sub-Committee on Warehousing, Handling, Transportation and Other Facilities, detailed information with regard to such facilities to be used as a basis for reporting recommendations to the next conference; (b) take action to persuade shipping lines to desist from resorting to the practice of fixing differential freight rates and changing rates without adequate notice and to

Useful Fruit Tree for Atolls

The capulin, or "Panama berry", *Muntingia calabura*, L., a fruit tree belonging to the tiliaceae family, was introduced into Tahiti several years ago. This is a very quick-growing tree which may reach 30 feet in height. The fruit, which is the size of a small cherry, is very sweet and quite palatable.

This species was first used in Tahiti as a shade tree along the streets of Papeete, but it has also been introduced into the atolls of the Tuamotu Archipelago, where it thrives on the coral sand soils.

The number of food plants which can succeed on atolls is so limited that it seems useful to draw attention to the potential usefulness of this species for the other low coral islands of the South Pacific. The yield of the capulin is certainly limited, but it is nevertheless a useful source of complementary fresh food for atoll dwellers.—J. BARRAU.

The Capulin, or "Panama berry" tree

request the United Nations and other international organizations to assist in securing relief from such practices.

(3) That a working party be established to make recommendations on establishing a joint promotion and information board for the coconut industry and to present schemes for its financing.

(4) That a committee be appointed to study ways and means of establishing and financing an international coconut research centre which will also undertake liaison between national research institutions and exchange experts and technical personnel between the centre and individual coconut producing countries.

(5) That the Food and Agriculture Organization be requested to undertake a survey of coconut acreage and production and establish a co-ordinated research program in the countries of Asia and the Far East as well as survey their coconut and coconut product marketing problems.

The working sessions of the Conference were closed to the public in order that discussions might be as free as possible. The Conference generally met as a committee-of-the-whole, but appointed sub-committees to develop recommendations regarding most items on the agenda.

The sub-committees will continue to work on their respective projects during the next year and will report to the next International Coconut Conference, which will be held in Colombo, Ceylon, probably late in 1956.

(Extract from *Foreign Agriculture Circular*, United States Department of Agriculture, Foreign Agricultural Service, Washington, D.C. October 26, 1955.)

Public Health Nutrition Programmes

(Continued from page 15)

personnel. Too often, important work has been put aside for lack of staff to run institutions, to carry out education and research work in the different territories.

To solve the problem of hospital and supervision, the Fiji Government has appointed a dietitian supervisor who is responsible for training local women to manage institutional kitchens. The work of the supervisor is very similar to that of the "shared dietitian" in America; her work is divided among a number of institutions.

This year marks the beginning of a 3½-year course for Assistant Dietitians. Intending students must be educated to Senior Cambridge standard. During the first year, the basic science, chemistry, physics and biology are studied at the Central Medical School. In the subsequent years, courses are taken in physiology and anatomy, cookery, nutrition, institutional management, public health and nutrition education. After passing final examinations at the end of the third year, students are required to do six months' field work under supervision,

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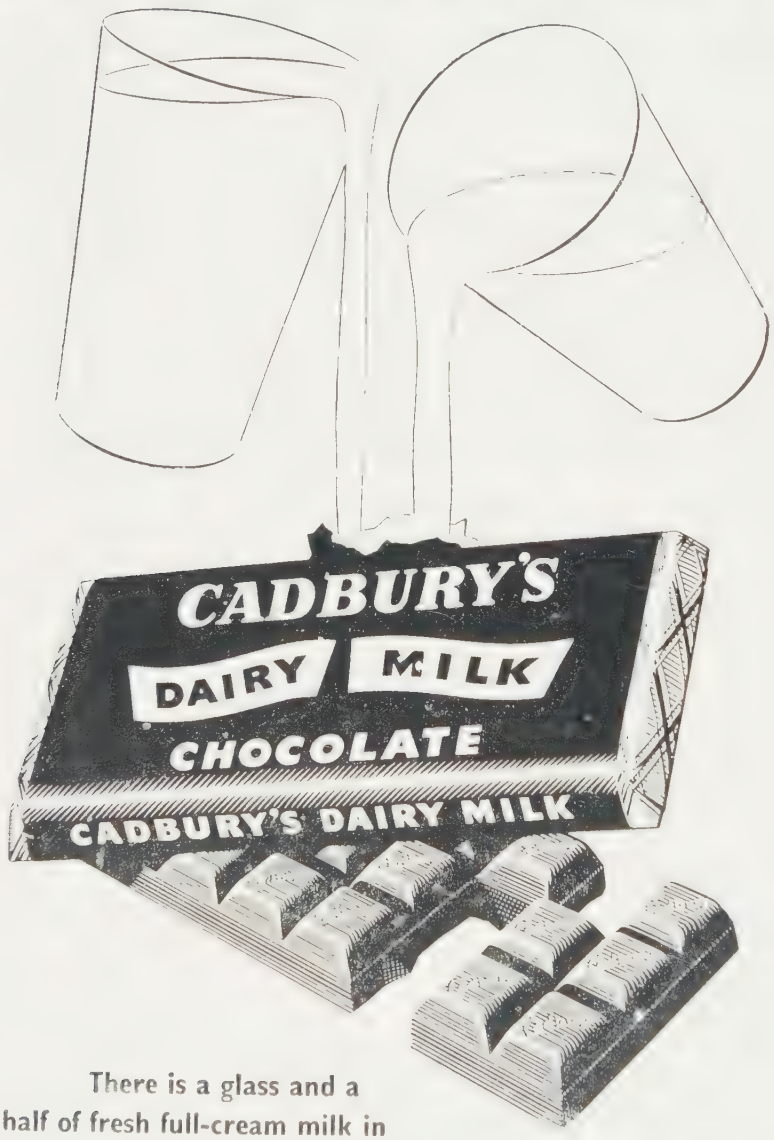

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before being appointed to a permanent post.

The first two students come from Fiji. It is to be hoped that in the next few years there will be applicants from other territories, so that we can look forward to the time when each territory will have an Assistant Dietitian attached to the Government service. This officer would be responsible for carrying out nutrition work in her home islands. Advice and supervision would be provided by the Nutrition Section, South Pacific Health Service.

A large proportion of our time has been devoted to teaching nutrition to nurses, medical, dental and other students. Courses in nutrition have been arranged for nursing and teacher training schools in all the territories visited. Regular courses are given at the Central Nursing and Medical schools in Fiji. Whenever possible, lectures are illustrated by demonstrations or visual aids. Field trips are made to places of interest, such as the radio station, the poster section and to a nearby agricultural station.

Nutrition education is not restricted to the class room. During their years at the nursing and medical schools, students learn to eat a well-balanced diet based on local foods, and the better types of imported foods such as milk.

In planning menus, we try to teach students to appreciate the value of their island foods, and village food patterns. Modern catering equipment in the medical and nursing schools have enabled cooks to prepare local foods by island methods, and, at feast times, "palusami" and many other favourite delicacies are cooked quickly and easily in the steam ovens.

A well-known anthropologist once told a meeting of nutritionists that nutrition had to be "sold"—not taught—to the public. Sometimes we fail to realise that a vague promise of better health is a poor inducement with which to persuade people, and especially Pacific island people, to change their food habits.

If nutrition programmes are to succeed they must be interesting, attractive and colourful. An illustrated story stays longer in the child's mind than a list of foods. Demonstrations are remembered when words are forgotten; menus must taste as good as they sound on paper.

Visual Aids in the South Pacific

(Continued from page 33)

be done in Sydney at the expense of the administration concerned.

Material for making up into filmstrips comes in from the islands from time to times, the latest being a series on leprosy, sent from Papua and New Guinea. These exposures are edited if required, titles are prepared and the strips processed.

Several strips have been made in collaboration between the Visual Aids Officer and territorial government de-

partments. During 1955 two such strips were made in Western Samoa on scabies and tuberculosis, while one on tuberculosis was made in colour in Tahiti. The scripts and photographs were prepared by the Visual Aids Officer in collaboration with the local health authorities. The exposures were then edited, titled, and processed in Sydney.

The advantage of this method is that it provides the territory with material specifically designed for its needs and, as well, features local people and backgrounds. The sight of a familiar face in a film or filmstrip always makes a considerable impression on audiences in any part of the world, and is a particularly successful method of drawing attention. Judging from the active interest and participation taken in these island productions by all village bystanders, the Samoan and Tahitian strips should not prove exceptions to this rule.

From this brief account of developments it will be seen that the understanding and use of visual aids has progressed in this area and it is to be hoped that the collaboration now established between islands and Commission will continue to develop, to the advantage of all.

Dairy Farm Established in Tahiti

(Continued from page 19)

plements to the pasture and manioc, which form the mainstay of the dairy herd.

The milk is taken by road to Pirae, about forty miles away on the outskirts of Papeete, where it is pasturised before being delivered in the town.

The station at Taravao enjoys rather special conditions which are not very common in Tahiti. The mountain slopes of the island have been so much dissected by erosion that in most places the deep valleys are separated only by steep, narrow ridges. Areas of gently-sloping elevated land are rather few, and some of them are difficult of access.

The Taravao station also has an abundant and well-distributed rainfall: it is much less affected by the dry season than the plateau behind Papeete. There is hardly any dry season at Taravao; even in the drier months there are frequent showers. (The photographs illustrating this article were taken at the end of the dry season and show both cattle and pastures in good condition.) There is also a good flow at all times in the creeks which supply the water piped to the paddocks—a very desirable feature for dairy cattle in a warm climate.

The shortage of accessible land similar to that at the Taravao station will prevent the methods used there from being widely applied in Tahiti. Nevertheless, several private farmers have followed the example of the Service de l'Elevage and taken up dairying, sometimes using heifers from the Taravao herd. Papeete has thus a supply of fresh milk after having for so long used almost entirely imported milk products.

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QUARTERLY READING LIST No. 18

A Bibliography of Publications relating to Social Development in the South Pacific.

THIS Reading List represents an attempt to note every item to appear in the field of Social Development in the South Pacific during the quarter; the entries are drawn from over 100 periodicals which are regularly examined, as well as from bibliographies, publishers' notices and similar material. Publications of the South Pacific Commission have not been indexed. Items marked with an asterisk have not been seen in the Social Development section. The Executive Officer for Social Development, G.P.O. Box 5254, Sydney, will be glad to obtain for any metropolitan or territorial Government copies of items listed.

SOUTH PACIFIC — GENERAL

Art

(1) WINGERT, Paul S.: Art of the South Pacific Islands. New York, Beechhurst Press, 1953. 64 pp., illus., maps.*

Education

(2) WEDGWOOD, Camilla H.: Some educational problems of the Pacific Islands. *The Australian Outlook,* vol. 9, no. 3, Sept. 1955. pp. 152-164.

Fishing

(3) SKINNER, H. D.: Anell "Contribution to the history of fishing in the South Seas": a review. *The Journal of the Polynesian Society,* vol. 64, no. 3, Sept. 1955. pp. 356-358.

History

(4) GWYTHER, John: Captain James Cook and the South Pacific. Houghton Mifflin, 1954 269 pp.*

MELANESIA

Anthropology

(5) KABERRY, Phyllis: Belshaw "Changing Melanesia: social economics of culture contact": a review. *International Affairs,* vol. 31, no. 4, Oct. 1955. p. 548.

POLYNESIA

History

(6) ADAM, Paul: Etude sur l'aspect nautique des liaisons Polynésie—Amérique du Sud avant l'arrivée des Européans dans le Pacifique. (Condensé de "Etude sur les migrations Polynésiennes", Revue Maritime, Janvier 1955.) *Bulletin de la Société des Etudes Océaniennes,* vol. 9, no. 12, Dec. 1955. pp. 485-493.

SOUTH PACIFIC COMMISSION

(7) ROBERTS, Bruce: The functions and organization of a literature bureau. Some conclusions from experience in Africa and the South Pacific. *Fundamental and Adult Education,* vol. 7, no. 4, Oct. 1955. pp. 142-147, part 1.

BRITISH SOLOMON ISLANDS

Linguistics

(8) HALL, Robert A. Junr.: Pidgin English in the British Solomon Islands. *The Australian Quarterly,* vol. 27, no. 4, Dec. 1955. pp. 68-74.

COOK ISLANDS

History

(9) GILSON, R. P.: Negotiations leading to British intervention in Rarotonga, Cook Islands. *Historical Studies: Australia and New Zealand,* vol. 7, no. 25, Nov. 1955. pp. 62-80.

(10) GILSON, R. P.: The background of New Zealand's early land policy in Rarotonga. *The Journal of the Polynesian Society*, vol. 64, no. 3, Sept. 1955. pp. 267-280.

FIJI

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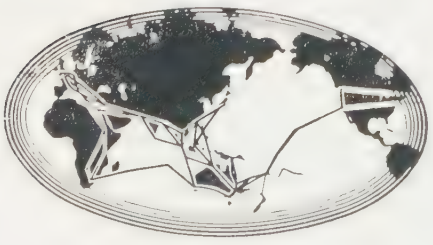

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MEDICAL ASSOCIATION OF NEW CALEDONIA

Three Papers Presented At March Meeting

THE Medical Association of New Caledonia met on 1st March at the headquarters of the French Branch of the Literature Bureau in Nouméa, under the chairmanship of Dr. Massal, Executive Officer for Health, South Pacific Commission.

The agenda comprised three papers.

Mr. J. Rageau, medical entomologist, French Institute of Oceania, commented on the reports of investigations carried out in Lifou and Ouvéa (Loyalty Islands) and on the *Ile des Pins* concerning "Arthropodes of medical and veterinary interest".

In the Loyalty Islands, Mr. Rageau reported the presence of several species of Culicidae, Tabanidae, Muscidae, Calliphoridae, Mallophages and Acarians, hitherto unknown in this group.

A rapid survey on the *Ile des Pins* revealed for the first time six species of Culicidae, one of Simulidae, one of Tabanidae and two of Asilidae.

Mr. Rageau gave some details on the biology and possible pathogenic role of local arthropodes. He indicated the control methods which seemed most appropriate.

Mosquitoes present the major medical problem. *Aedes vigilax* and *Culex pipiens fatigans* are the most dangerous species by reason of their marked anthropophilism, their density, often very high locally, and their possible role in the transmission of human filariasis to *Wuchereria bancrofti.*

The stomoxes and hippobosces are common parasites on bovidae and equidae.

Neither *Anopheles farauti,* the malarial mosquito of the New Hebrides, nor *Boophilus microplus,* the dangerous cattle tick, common in New Caledonia, which is a vector of bovine piroplasmosis, was encountered. Mr. Rageau stressed the need for strict measures of control (disinsectization of aircraft, control on cattle imports) to avoid introducing the above two parasites into these Islands.

Dr. Lacour, Director of the Pasteur Institute, Nouméa, presented his observations on the aetiology of dysenteric syndromes. Having retraced the historical evolution of the amoebic endemic —which he connects with the immigration of labour from Southern Asia— and of the epidemic outbreaks of bacillary dysentery, Dr. Lacour gave the results of examination of stools. Several strains of dysenteric bacilli were isolated by a number of stool cultures, and identified by serological tests. Their pathogenic role is unquestionable. Dr. Lacour drew the attention of clinicians to the relative frequency of the bacillary aetiology of dysenteric syndromes, the value of careful stool examination, and the therapeutic indications which his conclusions entail.

The papers presented by Mr. Rageau and Dr. Lacour will shortly be published in the Association *Bulletin.*

Dr. Massal gave an account of the meeting on health education of the people, held in Nouméa in January on the occasion of a visit by Mr. L. Keyes, Health Education Adviser to the World Health Organization, Western Pacific Regional Office. He recalled the advantages for the medical practitioner as well as for the public health officer of adequate health education of the people. He went on to describe the Commission's work programme in this field, the achievements of the Health Department (posters, pamphlets, etc.) and the project for the establishment of a Health Education Committee in the territory.

The meeting was preceded by three films on fish in Hawaii, skin troubles caused by cosmetics and vertebral pathology. The latter film, produced by the *Laboratoires Midy,* with a commentary by Professor de Seze, was considered particularly remarkable.

PACIFIC READING

No. 13

APRIL, 1956

This supplement is produced by the South Pacific Commission Literature Bureau; neither the Commission nor individual Administrations necessarily endorse any opinion or recommendation expressed anywhere herein. Every effort is made to check prices where quoted but they should be confirmed with suppliers before orders are placed. Inquiries concerning matters referred to herein should be addressed to the SOUTH PACIFIC COMMISSION LITERATURE BUREAU, BOX 5254, G.P.O., SYDNEY, N.S.W., AUSTRALIA.

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NOTES AND NEWS

Libraries in New Guinea. In *Pacific Reading* for March 1954 we published an article entitled "Libraries in Papua and New Guinea", by R. Thomson, Social Welfare Officer at Port Moresby. Mr. Thomson pointed out that the library service was an essential weapon in any campaign to defeat illiteracy, but it was still too early to measure its achievements in this regard. Since then much information has been obtained from a questionnaire circulated to about one hundred and fifty libraries in Papua and New Guinea, and while some of this information has not yet been fully collated and analyzed, Mr. Thomson has advised us of some of the important changes which have become evident in the reading habits of the native peoples of the territory. We feel sure these remarks will be of considerable interest to other areas in the Pacific which already have, or are contemplating establishing, library services. Answers to the questionnaire may be summarized as follows:

The library service in Papua and New Guinea is on the whole very successful, and meets with almost universal approval. But it seems at present that for the few who will graduate from this simple meal, there will be a number who will taste and leave, because although it is essential to meet the needs of an *élite*, the mass of people have reading needs, too, and a really satisfactory answer to the problem has not yet been found. Perhaps there is no one answer and the solution lies in a number of varied approaches.

It is obvious that the material now being made available to the territory from publishers is not meeting the needs of those newly literate. From all quarters come requests for simple and profusely-illustrated material, and it is increasingly difficult to meet them. Papers such as *Child and Pictorial Education, The National Geographic Magazine, Today,* and similar publications, seem to be needed in ever-increasing quantities, and the value of a locally-produced periodical would be considerable.

Most of the books being produced by the publishers still meet the needs of only very limited sections of the reading public and it is difficult to know just how to interest publishers and authors in the type of thing really wanted. It has been suggested that the publication of pictorial material might be augmented by advertising material, which should be readily available from many of the big concerns. In the early days of the book trade and long before home libraries became the fashion, it was the practice for broadsheets to be produced which could be held in the hand, read and destroyed. Possibly we should pay more attention to this

simple form of production nowadays. Even the simplest texts tend to produce an inferiority complex in the newly-literate who lacks the day-to-day guidance of a school.

There is a tendency for much of the material we have been able to obtain to be disregarded, and this may be because its presentation has underestimated the value of the element of pleasure in developing the reading habit. It is interesting to note the change in reading habits in the territory; replies from many libraries indicate a trend towards the fiction and enjoyment aspect of literature. It seems that much has yet to be learned about the needs of the newly-literate person. The wastage from those who take elementary courses may be due largely to an inability to make reading something worth while. The publishing houses are catering for the fully-literate and for those who have learnt to be eclectic in their approach to reading, rather than the very inexperienced reader.

An analysis of reading habits shows that for the most part we must continue to give the most careful thought to the needs of those who are still only at the first rung of the reading ladder. Although one hundred and eighty libraries have already been established, some of these cannot be fully effective until needs at the lower reading levels can be better met. Libraries in the middle of areas where no more than one or two people are fully literate in English present considerable problems; the books on the shelves, if too difficult, cannot act as an incentive to learn English and so beginners remain illiterate as far as English texts go. Increased provision for texts in Pidgin or in the vernacular could in some cases be of assistance; but perhaps no country in the world has the problem of a multiplicity of differing languages spoken by only small groups of people to such an extent as is found in the territory.

Tour of Literature Bureau Officer: Mr. Douglas Pearce, Assistant Organizer for Island Literature, visited Western Samoa and Fiji in November and December. The primary reason for his visit to Western Samoa was in connection with the establishment of library and book-selling facilities in the territory. The Western Samoan Government has already built up, through its Education Department, an extensive library service for school children, and has devoted attention to problems concerning the establishment of a Central Library to cater for the reading needs of all sections of the population. The Methodist Mission is building an impressive new bookshop in Apia, and they plan to stock a wide range of secular reading material (in addition to religious books) designed to meet the need for books among the Samoan general public. Moreover, the Government is considering the establishment of a Literature Committee which will be able to keep in constant review the literature problems of the territory, in addition to performing clearing-house service for manuscripts.

In Samoa, as elsewhere in the Pacific, rapidly advancing educational standards are producing increasing numbers of people literate in both their own language and the language of the metropolitan country. To meet the need for reading material during the school years and after, energetic steps are needed to provide suitable literature through libraries and bookshops. Attention to these problems is being given in many territories.

The New Zealand and Western Samoan Governments have kept the problems of literature provision under constant review, and the steps they are now taking will considerably assist in meeting them. The full co-operation of the Government of Western Samoa made it possible for Mr. Pearce to meet many people interested in the provision of literature. Government officials, Samoans and educational missionaries all showed keen interest in literature problems.

In Fiji Mr. Pearce was able to meet departmental heads, representatives of missions and booksellers, and to discuss with them ways and means by which the distribution of literature might be facilitated in the territory. Moreover, it was possible to discuss ways in which the Literature Bureau might prove of assistance to the colony in its literature problems.

Book List. Which would you prefer: A small number of books reviewed at length or a larger number reviewed briefly? We have put this question to several people in the islands, and the majority seem to be of the opinion that a larger number of books reviewed briefly would be preferable. We have, therefore, over the last year, tended to give shorter accounts of books in the Book List, and this tendency has been accentuated in this particular issue. We should, however, like to have more opinions on this matter, and should welcome receiving letters about it.

Pacific Broadcast Recording Clearing House. Although the Pacific Broadcast Clearing House is not yet established as a working service, the response to the first circular sent out has been remarkably enthusiastic. Apart from the amount of enquiries and requests received, a number of tapes and discs has already been received. These include songs and dances from the Gilbert and Ellice Islands Colony, Cook Islands, the Samoas, Solomons, and Papua and New Guinea. As soon as practicable a list will be issued for the information of those interested in the scheme.

Posters Printed at Ponape. Some time ago the Health Department of the Trust Territory of the Pacific Islands wrote to the Visual Aids Officer to ask for assistance in producing nutrition posters. As a silk-screen outfit had recently been set up on Ponape, designs were prepared in Sydney, from the Trust Territory's roughs, specially adapted for silk-screen printing. The Visual Aids Officer recently received prints made at Ponape and has been very impressed by the quality of the work. In the belief that these examples would interest other islands where silk-screen is being done, a request has been made to the Trust Territory for a further supply of the posters to be made available for examination.

Tour of Visual Aids Officer. Immediately after returning from leave in the Gilbert and Ellice Islands Colony, the Visual Aids Officer left for a tour of duty in the Eastern Pacific, visiting Samoa, the Cook Islands and Tahiti. In the fourteen months since her last visit to New Zealand territories the Visual Aids Officer noticed a marked increase in the knowledge and use of visual aids. In Tahiti there was also a live interest in this subject and its possibilities.

Specimens of Pacific Visual Aids Materials. In an article appearing elsewhere in this issue, "Visual Aids in the South Pacific", mention has been made of several posters and filmstrips produced by territorial Governments in collaboration with the South Pacific Commission visual aids project. Copies of these materials made in Samoa and Tahiti are available for inspection, on application to the Visual Aids Officer.

BOOK LIST No. 13

Items reviewed have been chosen for their general interest or for their relevance to educational and development problems in the South Pacific area. Wherever possible the price stated is the published price in the country of origin.

GENERAL READING

HELPING HANDS. G. C. Thornley. London: Longmans, Green; stg.2s. 1955. 96pp. Illust. *(Practical Readers' Series)*

Several excellent courses for teaching English in overseas schools exist, and the vocabulary grading used in the various stages of these courses derives from fundamental research into word frequency lists, word values and so on. While this provides the young student with a sound practical knowledge of the English language as regards general conversation and reading, it is clear that this general vocabulary needs supplementing if he enters a course of special training, e.g. carpentry, building, agricultural or health work and so on. *The Practical Readers* provide a useful contribution to the solution of this problem, being designed to be used as supplementary readers rather than as a self-contained English course. In *Helping Hands,* the first of the series, it is assumed that the student knows only about 450 of the commonest English words and the book has 18 stories with titles such as *Making a Work-room, The Dog and the Paint, Henry and the Radio-set,* in which about 100 new words of a practical or semi-technical nature, which are unlikely to be found in the usual school courses for overseas students, are gradually introduced in a context which makes them meaningful. The setting of the stories, and the illustrations, is not that of a tropical area, but in the circumstances that does not appear to matter. Teachers of vocational classes, especially of the trades-training type, will be interested to examine these books, especially as students in such classes tend to be drawn from several different language areas, so that English must be the lingua franca. Two other titles in the series are available also—*The Lock* and *Taree Trains.*

LIZARD STORIES. A. S. Ryan. London: Blackwell; stg.1s. 6d. No date. pp.16. Coloured illus.

This series of little books relates stories about Mr. Lizard in various tropical settings; titles include *Lizard and the Melon Seeds, Lizard and the Hurricane, Lizard and the Breadfruit Tree* and so on. The setting of the stories is very slightly West Indian, but not so much as to cause any difficulty for Pacific readers. The stories are light-hearted and amusing, attractively illustrated with black and white drawings and three-colour line, and would be useful as supplementary readers at about middle junior school level. The print is in a large sans-serif type, but it is debatable whether this improves legibility.

ROAD SAFETY. A. M. Jones. Cape Town; Longmans, Green; stg.1s. 6d. 1954. pp.72. Illust. *(Pathfinder Books)*

The necessity for safety precautions on the road is constantly being emphasized in many countries, and suitable publicity is given to the subject. There is also a need in many newly-developing countries to acquaint people with the elements of road courtesy and safety precautions; but little appears to have been published in suitable form for newly-literates on this subject. The rules and regulations laid down for road users are probably difficult for native peoples to understand and, in any case, often do not include as much information as can be given in book form. This book is one attempt to remedy the situation, and has been primarily designed for the Central African territories, (i.e. Southern and Northern Rhodesia and Nyasaland), where the rules of the road are similar to those applying in the United Kingdom. It has been simply written, and the illustrations show clearly the right and wrong way for road users to conduct themselves. It could, with some adaptation, be found useful in most places, and does present basic information which should prove of assistance in improving road courtesy and applying common sense to increase safety on the roads.

HOW TO LOOK AFTER YOUR BICYCLE. C. G. Ferguson. London: Macmillan; stg.1s. 1955. pp.16. Illust. (*How it is done*)

This simply-written, well-illustrated booklet will undoubtedly prove of use and interest among islands peoples. It describes the everyday care required for a bicycle and how to perform simple repairs and maintenance such as: mending a puncture; adjusting brakes, saddles, handlebars, and three-speed hubs; and tightening chains. The increasing use of many mechanical devices in the islands indicates that there is a growing need for simply-written books of this nature.

THE OVERSEAS POETRY BOOKS. Book 3. Edited by Dennis Herbert. London: Longmans, Green; stg.1s.3d. 1955. pp.120.

The editor of this book has had long experience of educational work among Africans. The first two books in this series were designed for the early years of English teaching, but this book is at a more advanced level and will probably be suitable at about sixth year of English upwards. It is an anthology, mainly of the works of English poets, and the selections have been kept fairly simple.

THE MAKING OF A BOOK. G. A. Campbell. London: Oxford University Press; stg.1s.10d. 1955. pp.88. Illust. (*Men and Women at Work*)

A growing interest among the islands peoples in reading will probably mean that they will also be interested in this book describing how books are produced. It has been simply written in a vocabulary of about 1500 words, and describes in an interesting manner all stages of book production, including composing type, correcting proofs, printing, binding, etc. Perhaps it will be of particular interest to those in the islands who are producing their own school journals.

GEOGRAPHY

COLOUR GEOGRAPHY. T. Herdman. London: Longmans, Green. stg.2s.6d. 1955. pp.40. Illust.

Twenty of these little books have already been published, and their content deals in an introductory way with the physical, economic and social geography of the various regions of the world. Each book in the series deals with a selected region (e.g. Book 9, *The Great Plain of China*), and sometimes deals with only a particular aspect of the region (e.g. Book 7, *Mining in South Africa*). The writing is 'narrative' rather than 'text-book' style; although quite simple, it has not been specially adapted for the needs of island or other schools where English is not the mother tongue. However, the series is especially valuable for making available at such a moderate price, a text so richly illustrated by drawings, black and white photographs, and also a selection of photographs in full colour. Admirable books for the libraries of island schools, and the skilled teacher could make excellent use of them in the islands, too.

PROGRESSIVE ATLAS. Compiled by a Joint Advisory Board. London: Collins-Longman; stg.3s.0d. 1955. pp.28.

It is surprising how many of our activities today depend on being able to read and interpret symbols, i.e. substitutes for, or representations of, the real thing. Maps, charts, diagrams, graphs, isotypes and so on seem to crop up every-

where in our lives, whether we are trying to lay out some contour ridges, read a building plan, argue about some title deeds, or measure someone for a new dress—and a lot more besides. Indeed, the written or printed word itself is only a symbol, and it would be possible to make out quite a good case that if man's social progress depends on being able to read the printed word, his material progress depends on his being able to read and understand the multifarious use of symbols. This book is not an atlas in the ordinary sense of the word; it is a book to precede the use of an atlas, and as such deserves most careful thought by teachers. It starts off with a picture of John's house, the garden, followed by an aerial view of them, and then by a 'map' of them. Next we are shown the house in its immediate surroundings, each depicted in the same three ways; gradually the size of the unit being considered is expanded—and, of course, the map scale is correspondingly decreased; we see the village, then a town, then a city, and later on some mountainous country and then a whole map of England, though in this case it doesn't matter much what country is chosen. The whole book is beautifully produced, in full colour, and the pupil is led on to a very good understanding of just what a map is, how various colours and symbols are used and what they conventionally represent, the use and reading of scales, and so on. The text accompanying the various pictures is brief and clear, and consists chiefly of little questions to exercise the pupil's understanding of what he is being taught. Your reviewer felt that this book gets right down to matters of fundamental importance in educational work; it makes no attempt to clutter up the child's memory with masses of facts; it seeks to train him how to use the tools which later on in life he will find readily at his disposal; and although in this case the work applies primarily to maps and atlases, the value of what he has learned will spread far outside the realms of just 'geography'. The price of the book is remarkably low considering its standard of production.

The Essential Spelling List for South-East Asia

F. J. SCHONELL, P. M. CLEMENTS and L. I. LEWIS

This adaptation of the well-known spelling list includes words needed by children in South East Asia. Approximately 3,300 everyday words have been carefully selected and graded throughout six groups suitable for children aged 7-12. 2*s*.9*d*., Aust.

How to Look After Your Bicycle

C. G. FERGUSON

The first in a new series of instructional booklets. A Malay edition has also been published. *How Your Camera Works* and *How to Use Your Sewing Machine* will shortly be published. *Illustrated.* 2*s*.1*d*., Aust.

Food and the Work it Does

LUCY HAMILTON

Written by the Dietician of the Department of Health in Papua and New Guinea, and published in association with the South Pacific Commission Literature Bureau, this book offers a guide to better eating for island people. *Illustrated.* 3*s*.0*d*., Aust.

Macmillan & Co. Ltd.

32-34 Flinders Street, Melbourne, C.1

PHYSICAL EDUCATION

PHYSICAL EDUCATION FOR AFRICAN PRIMARY SCHOOLS. C. E. Whitworth-Smith & G. K. Huntley. London: Nelson; A.14s.0d. 1955. pp.207. Illust.

Provides a three years' course for junior classes and is carefully arranged to meet the needs of teachers. The content of the book is divided into three years; the work for each year is divided into three terms; and for each term a complete set of activities and tasks, illustrated with stick figures, is given separately for each of twelve weeks. At appropriate places throughout the book there are notes to the teacher explaining the why and wherefore of the various exercises and games; indicating how to introduce them and get them efficiently carried out; and noting what the teacher should look for and strive to achieve. There is also a short introduction, discussing the objects of physical education and giving a set of guiding rules for conducting the physical education period. Teachers in the Pacific who are keen to improve the standard of physical education in their schools should find this book invaluable for its workmanlike approach, and will find that the amount of material requiring adaptation for Pacific conditions is insignificant.

SOCIAL STUDIES

THE LORIMERS AT HOME—AN ENGLISH FAMILY IN THE FIFTIES. F. Y. Thompson. London: Longmans, Green; stg.7s.6d. 1955. pp.vi + 250.

Students at an advanced level in the islands who devote much of their time to the study of English may welcome this book. Its main purpose is to give the overseas student of English—who may not have the opportunity of visiting England—a background of the way of life of an English household, and, at the same time, to improve his knowledge of the idiom of everyday English conversation. The book is written in narrative form and includes conversation, and as much commentary as the various incidents and points of view require to make them understood by readers abroad; brief notes are added to explain contemporary matters. One particularly important aspect of this book is that it will enable students who already have a very good command of English to be able to appreciate much of what is being written in English today: not only in novels and stories which deal with the background of contemporary English life, but also in newspapers. The book's approach to English everyday life is really up to date: the principal character of the story, the mother of a family, works for a living. A good deal of ground is covered by the book, and the subjects which are dealt with are extremely diverse: English eating habits, housing, architecture, social services, broadcasting, social life, education, heating and lighting, local government, industry, transport, personal incomes and expenditure, etc. It should be emphasized that this book is only for those with advanced knowledge of English.

THINGS WE ALL KNOW (Book 2). R. J. Candy. London: Macmillan; stg.1s.9d. 1955. pp.32. Illust.

An attractive little book, either for general class reading at senior primary school level, or for the junior school library. Fifteen topics are dealt with, each describing how some common article or substance is made—for example, glass, steel, soap, paper, etc. A single topic is dealt with at each opening of the book—black and white drawings and diagrams on the left-hand page, text on the right.

THE STORY OF THE ANCIENT WORLD. H. A. Clement. London: Harraps; stg.4s.9d. 1936. pp.256. Illust.

Sub-title, 'From the Earliest Times to the Fall of Rome'. This book is constructed on definite school text-book lines, complete with questions and exercises, and is well illustrated

with line-drawings and photographs. The material is post-primary school level, but the language is reasonably simple, and its content of historical fact is enlivened by the inclusion of many stories, myths and legends from ancient times. It is a good, simple source book for school supervisors in the Pacific, and should find a place in libraries of senior schools and institutions.

THE STORY OF MAN (Part 1). J. B. Neilson. London: Longmans, Green; stg.3s.6d. 1955. pp.144. Illust.

The sub-title of this book is 'The World of Long Ago', and after a very brief glance at earliest known man—our knowledge of whom is derived from relics, fossils, and cave drawings—the book takes us through early Egyptian history, and the story of Mesopotamian peoples up to the rise of Rome. There are also chapters on ancient India, China, the Phoenicians and early Greece. The story is quite simply, though inevitably very briefly, told and contains a number of black and white illustrations. There has been some evidence from enquiries which the Bureau has made and letters we have received, that island people are often interested in reading about these ancient times, and this book should prove useful in that connexion; its level would make it suitable for teacher-training institutions, upper primary school libraries and for personal reading by those who have had five or six years' training in English.

MODERN TIMES. Edited by E. J. S. Lay. London: Macmillans; stg.3s.6d. 1955. pp.108. Illust.

The work of many famous contemporary authors is included in this anthology which reflects social life in England from 1900. H. E. Bates, H. V. Morton, J. B. Priestley, A. P. Herbert, and A. G. Street are some of the authors whose works have been used to illustrate various matters such as travel, broadcasting, sport, war, farming, etc. The book is really for those whose mother tongue is English, although the writing selected is simple and direct and may prove of use in the islands in the final year of secondary education.

SCIENCE

WAYS OF THE WORLD. G. C. Thornley. London: Longmans, Green; stg.3s.6d. 1951. pp.145. Illust. (*The Bridge Series*)

This book is based on facts, and most of it has a background of nature or science. It has been written in a vocabulary of about 7,000 words, and, like other books in "The Bridge Series", is designed to assist in gradually widening the vocabulary of students who have completed one of the recognised English courses and have acquired an English reading vocabulary in the region of 3,000 words. Its chapter headings give a very good indication of the contents; they are: "Clocks and Time", "City Transport", "Safety at Sea", "A Modern Hospital", "Society and the Criminal", "The Earth's Crust", "The Soil", and "Electricity in the Home". It will probably be of interest in upper forms of secondary schools and among adults. Other titles in "The Bridge Series" are *Some Adventures of Sherlock Holmes, Three One-Act Plays* (this was reviewed in Pacific Reading No. 9), *The Mysterious Universe, Power and Progress, Nicholas Nickelby and Mr. Squeers,* and *Cry, The Beloved Country.*

ECONOMICS

LOOK-ABOUT-YOU ECONOMICS. A. Wilcox. Leeds: E. J. Arnold; stg.2s.3d. No date. pp.64.

Although written primarily for British school children and containing references which, to some extent, limit its uses to Great Britain, this book may prove of some interest in Pacific territories at secondary school level. It describes how the national income of Great Britain is divided and why it is divided in the manner it is; it shows how exports pay for imports and discusses what exactly trade is; inflation

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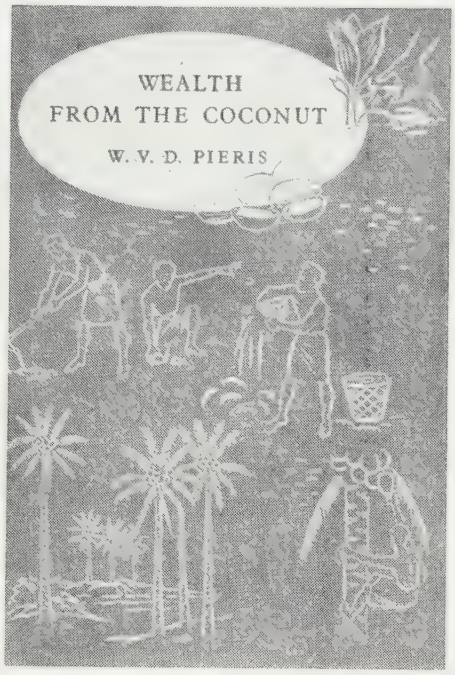

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and deflation are examined and their consequences compared. Having given a concise and simple explanation of these few basic facts, the remaining 30 pages of the book are devoted to questions which will enable pupils to probably learn more than they would from a series of dogmatic statements.

LIBRARIANSHIP

DEVELOPMENT OF PUBLIC LIBRARIES IN AFRICA. Paris: Unesco; stg.9s.6d. 1954. pp.155.

This interesting book is the report on the Ibadan Seminar. It will probably be of interest to educationists and librarians in the islands, as it includes useful information on providing suitable reading material for libraries, planning library development, and distribution techniques in library work. Moreover, it covers such matters as the development of reading habits and the work of literature bureaux in Africa. A useful bibliography on libraries and librarianship is included at the end of the report.

HEALTH

ILLUSTRATED PRACTICAL NURSING PROCEDURES FOR HOSPITAL ASSISTANTS. Josephine Scott. London: William Heinemann; stg.15s. 1954. pp.116. Illust.

For some time a need had been felt in Central Africa for a well-illustrated book for African nurses and hospital assistants. This book, written by the matron of a hospital in Central Africa, has been designed to meet this need. It describes, in a fairly simple manner, nursing techniques from elementary to advanced stages. Although hospital practices and procedures differ widely in various parts of the world, this book may prove of some use in various places in the Pacific, to assist in meeting the demand for material of this nature until such time as something entirely suited to local needs is produced.

DOMESTIC WELFARE

NEEDLECRAFT HANDBOOKS. Books 1-6. E. Griffith. London: Oxford University Press; stg.1s.3d. each. 1954. pp.16 each.

With the aid of numerous simple line drawings, these booklets explain various aspects of needlework. Book 1 covers Stitches, Hems, and Seams; Book 2, Facings and Openings; Book 3, Pleats, Darts, and Gathers; Book 4, Edges; Book 5, Collars, Sleeves, and Skirts; and Book 6, Repair Work. The books have been designed so that they may be used in conjunction with *The New Manual on Needlecraft* by the same author. The drawings illustrate the text so well that it would be possible for almost anyone to learn needlecraft from them.

TERRITORIAL PERIODICALS

TRITON. Leeuwarden: Government of Netherlands New Guinea; d.fl.1.50. Monthly. pp.16-20. Illust.

This periodical commenced publication at the beginning of 1955. Already it has over 1,000 subscribers and is proving very popular in Netherlands New Guinea. It is printed each month in Holland and, to assure that it is of topical interest, the entire edition is sent by air mail to Netherlands New Guinea. Articles are mostly written in the Malayan language, though some are in Dutch, and each issue deals with a variety of subjects concerning the Netherlands New Guinea and other parts of the world. The majority of the space in *Triton* is, however, taken up by really excellent photographic illustrations, and some of these are in four colours. As it is produced in Malay, it will be of limited practical use in the South Pacific outside of Netherlands New Guinea; but it is such an interesting example of the manner in which a territorial periodical intended for islanders can be produced, that it would be well worth while for those who are interested in this matter to obtain a copy.

VISUAL AIDS

Films in the Commission library are marked with an asterisk before the title, and are available for viewing by any metropolitan or territorial government on application to the Executive Officer for Social Development, Box 5254, G.P.O., Sydney, N.S.W., Australia. Age classifications, where given, are intended as a guide rather than a recommendation.

Educational Films

ALCOHOL AND TOBACCO. 16 mm. 10 min. Black and white. Sound. Coronet Films. Price £A.20.

The object of this film is to show clearly the effects that alcohol and tobacco have on the system. It is explained that they are poisons, but, unlike other poisons, they are available to us if we wish to take them and that the responsibility rests with us. Experiments on human subjects are shown and it can be seen how even small quantities of alcohol slow down reactions and how regular intake of nicotine, in smoking, slows mental processes, lowers powers of endurance and affects heart and nerves. The habit-forming character of both alcohol and nicotine is emphasised. The film does not preach in any way, but states the facts, and the emphasis is on health rather than the social or moral aspects of the subject.

BASKETBALL FUNDAMENTALS. 16 mm. 14 mins. Black and white. Sound. Coronet Films. Price £A.30.

The titles say that this film is for boys, but the principles involved should be equally useful for female players. It is an instructional film which is devoted to techniques of playing—shooting goals, different kinds of passes, stops, turns, faking, dribbling and the difference between offensive and defensive play. There is a good deal of repetition and the instruction should be easy to follow.

CARE OF ART MATERIALS. 16 mm. 10 min. Black and white. Sound. Young America Films. Price £A.15.

It is hard to know whether the partial use of animated objects helps or hinders this film—for some audiences it may be a stimulant, for others it may be confusing to have tubes of paint wandering about with arms and legs, and chalks and paint brushes with faces, and so on. On the whole, however, the lesson is a good one, and clearly told—look after your things, keep them clean, use them carefully, put them away. If you want them to last and be any good to you, don't leave them on the floor, don't put brushes in hot water, don't leave tops off jars and tubes, don't leave crayons in hot places, and don't leave modelling clay uncovered by damp rags. Anyone can understand and follow this film, and it should prove a useful subject for any junior school.

COLOUR. 16 mm. approx. 15 min. Colour. Sound. Produced by Imperial Chemical Industries. Price £A.18.

This is a very beautiful film on colour in general—colour in nature, in industry, in everyday life; the immense importance of colour in our world, how man has learnt to make colour dyes from vegetable and mineral sources, refining and grading until we now have an infinite variety at our disposal. Starting with an explanation of colour's dependence on light, a great deal of the film shows experiments in making and mixing chemical dyes, but there is also reference to first primitive means of making dyes and paints. The colour of the film itself is of the highest quality.

DON'T BE A CARRIER. 16 mm. 18 min. Colour. Sound. Agriculture Department, Victoria. Price, apply.

Although a good deal of this film does not apply to the Pacific Islands, the main theme is rather important in these days of spreading plant diseases and pests. The film shows how easily insects and diseases have been carried from one part of Australia to another; phylloxera, which destroyed thousands of grape vines, black spot and codlin moth, in apple and pear, fruit fly and so on. In almost every case the damage has been done innocently or through thoughtlessness, but the consequences have been disastrous to agricultural workers. Phylloxera may not mean much to islanders, but substitute rhinoceros beetle and the moral becomes clear enough.

JAPANESE FAMILY. 16 mm. 24 min. Black and white. Sound. McGraw-Hill. Price £A.50.

Borrowers from the South Pacific Commission library may remember a film, reviewed here earlier, called *Pacific Island*, made on Likiep by Julian Bryan. This story about a post-war Japanese family was made by the same man and is a careful, quiet picture of their daily life. The focus of attention is a little brother and sister who live with their parents in the ancient city of Kyoto. The family have been silk weavers for generations and the fine intricate work on spinning wheels and looms is done by all adult members of the family from traditional designs. The film shows the children going to school, doing their homework, having their meals, amusing themselves with games and so on. At the New Year there are traditional Japanese ceremonies, celebrations and entertainments; the children go to Osaka to see the famous puppet show and after the performance are taken backstage to meet the puppeteers and see how the wonderful models are worked. It is an interesting and pleasantly-made film, simple and natural in its treatment and should be of general interest to all ages. It would have been very charming made in colour.

LEARNING TO MIX COLOURS. 16 mm. 5 min. Colour. Sound. Young America Films. Price £A.15.

A very short introduction to the subject of mixing colours for painting. First the primary colours are shown, then the secondary colours that can be obtained by mixing the primaries. As in another film on colour reviewed here, emphasis is laid on the importance of colour in the world and in our lives.

MAKING POSTERS: SILK SCREEN METHOD. 16 mm. 20 min. Colour. Sound. Bailey Films. Price, apply.

The subject of printing by silk screen has become so widely known now in the Pacific that this film will very likely interest a number of people. Unfortunately it is better suited to those with some knowledge and experience of the subject than to beginners, since it takes a good deal for granted and moves rather fast. It needs reshowing and explanation if it is to be used for instruction. It shows how to make a frame and attach the silk; different kinds of stencils, photographic, tusche and lakron paper; how to make a poster using all three methods; how to block out the screen and mix paints. Printing and cleaning of screens is also shown and the film is an effective one, with the main fault of moving too quickly.

NEW ZEALAND: A WORLD POWER. 16 mm. 20 min. Black and white. Sound. This Modern Age. Price £A.40.

An interesting account of New Zealand and its development to its present importance in the world. Starting with the coming of the Maoris, the film goes on to the British Settlers; their clearing of the land and introduction of sheep; the Maori wars; industries; imports and exports; education; the arts; recreations; social services; the position of the Maoris and the situation in New Zealand as it is today. There are scenes of Maori life in New Zealand and of an official visit to Samoa. The film is well conceived and well photographed.

THE STORY OF MONEY. 16 mm. 16 min. Black and white. Sound. Gryphon Films. Price £A.12.

This is a little history of how modern currency developed from earliest days and it tells its story very clearly and simply. Even to people who, like the present writer, do not understand finance, it is a fascinating story. The early days of barter are replaced by an exchange of ornaments, then metals, gold, silver, copper, iron. For convenience the metals are made into discs, and as they are usually issued by the head of the community, they carry his likeness on one side, the other side showing one of the commodities which the coin can buy—such as sheep, wheat, etc. From owning only such personal forms of wealth as goods, land or jewels, people moved on to the collection of money itself. A banking system began to emerge from the custom of depositing money with goldsmiths; the issuing of receipts led to bank notes, then to cheques; an informal custom of clearing cheques in London coffee houses led to the establishment of central cheque clearing houses. After showing what happens to

a cheque that is paid into a bank, the film ends with a general picture of the importance of money to any community and the necessity to keep it circulating.

Filmstrips

*AUSTRALASIA. Mapstrip No. 2. Produced by Educational Productions Ltd., London. Black and white. 29 frames. Double frame. Captions. Teaching notes. Published price stg. 15s.

Subject: Map illustration.
Medium: Drawings.
Technical Standard: Good.
Comment: In the introduction to the teaching notes for this strip the publishers explain that it is meant to be an aid to geography teaching rather than a substitute for good oral instruction. Suggestions for its application include use as an introduction to the subject, for revision, as material on which exercises might be based. The maps, mainly of Australia and New Zealand, show temperature, rainfall, vegetation, artesian basins, wheat, fruit, sheep and cattle areas, mineral resources, rail and air routes and the geographical relation of Indonesia and the Philippines to Australia. The notes are brief, but informative. . . . . 10 + ages.

LOGINA. Produced by Centre Audio-Visuel d'Haiti. Department de l'Education Nationale. Black and white. 21 frames. No captions. Commentary typed in French.

Subject: The rewards of industry.
Medium: Drawings.
Technical Standard: Average.
Comment: Logina lives in the country with her peasant family until one day her mother takes her to town and registers her at the Labour Exchange. Soon afterwards she gets a job as a domestic, where she is trained to wait on table, cook, clean and look after the house. She learns to wear shoes, goes to night school, where she learns to read, and with her savings buys a sewing machine. "Et voici la conclusion de son comportement!"—Logina walking down the aisle on the arm of a bridegroom. Simple, well presented, cleverly thought-out. . . . . General.

*MAKING A FILMSTRIP BY THE ENGRAVING METHOD. Produced by U.N.E.S.C.O. at the Audio-Visual Aids Seminar, Delhi, 1952/3. Black and white. 62 frames. Captions and subtitles. Teaching notes. Published price, apply.

Subject: Method of filmstrip production.
Medium: Photographs and engravings.
Technical Standard: Average.
Comment: This filmstrip should be very interesting to people who want to make their own filmstrips without using a camera. The images are engraved with a sharp tool on plain exposed 35 mm. safety film which can then be put straight into the projector and used. This filmstrip shows first the tools needed, all of which could be home made, then how to set up the work and how to engrave. The last part of the strip shows the actual engraved filmstrip. By studying the photographs and carefully reading the notes, it should be possible to make an attempt at this work without any previous experience.

*THE MANUFACTURE OF TEXTILES. Part one. *Raw Materials.* Produced by Educational Productions, London. Black and white. 30 frames. Captions and subtitles. Teaching notes. Published price, apply.

Subject: Materials used for textile manufacture.
Medium: Photographs. Drawings.
Technical Standard: Good.
Comment: This is an interesting strip, though it can only serve as an introduction to the subject, since each section is brief and rather superficial. The notes are also rather on the short side, but if these limitations are accepted the general impression is good. There are five small sections which deal with cotton, flax, wool, silk and viscose rayon. There are maps marked with the areas where each is grown, and photographs show something of harvesting methods and the nature of each kind of fibre . . 10 + ages.

*MATHEMATICS. Strip 1. *The Football Field.* Produced by Educational Productions Ltd., London. Black and white. 27 frames. Captions. Teaching notes. Published price stg.15s.

Subject: Geometrical facts in a practical setting.
Medium: Drawings.
Technical Standard: Good.
Comment: Perhaps the best way to describe this filmstrip is to quote the introduction to the teaching notes. "This series of film strips is designed to provide an introduction to a wide range of mathematical topics suited to the Modern School. For these pupils, who are not, in general, academically-minded, and who will not usually proceed with more-advanced work, the formal Grammar School treatment of mathematics is ineffective. It is imperative that the subject matter shall have its roots in the environment of the child.

The topics have been selected because of their interest to the child and to the average citizen. The pictures are arranged to show how these everyday things depend on mathematics, or how they are associated with it. Each picture or group of pictures is the starting point for a mathematical ramble, the length of which depends on the class and the teacher. The notes indicate some of the paths which may be taken, but the previous knowledge of the class and the interest in the topic will be the deciding factors.

Some skill will be needed to link up the fruits of these rambles, one with another, to show that they are parts of the same vast subject on which so much around us depends; but this method of approach will help to show that mathematics is not a meaningless set of mysterious rules, but a vital subject of intense interest and importance to the average citizen."

So far we have not received any reports from users of this strip, which is available for trial to any territory, but the idea behind it is an excellent one and worth experimenting with. . . 13 + ages.

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*NEW ZEALAND. Part one. *Natural Background.* Produced by Educational Productions Ltd., London. Black and white. 36 frames. Captions. Teaching notes. Published price stg.15s.

Subject: Physical features of New Zealand.
Medium: Photographs. Maps.
Technical Standard: Good.
Comment: A general picture of New Zealand which concentrates on its physical features—the Southern Alps, fiords, lakes, plains, volcanoes, and hot springs. There is a section on climate and one on natural vegetation. This strip, taken together with part two, *Human Aspects,* shows the relationship between man's physical background and his activities. Some of the photographs give glimpses of the beauties of these lovely islands. . . . . General.

*NEW ZEALAND. Part two. *Human Aspects.* Produced by Educational Productions Ltd., London. Black and white. 44 frames. Captions. Teaching notes. Published price stg.15s.

Subject: What man has done in New Zealand.
Medium: Photographs. Maps. Diagrams.
Technical Standard: Good.
Comment: Although there is a brief reference to the types of people inhabiting New Zealand, the main emphasis is on what they have achieved in industry, agriculture, mineral wealth, cities and communications. Dairying, cattle raising and meat export for Britain are shown. Sheep farming, orcharding, timber, and flax growing. Maps and charts give rainfall and temperature and physical features are marked on relief maps. With part one, reviewed above, and the film on New Zealand also reviewed in this issue a fairly good idea of the country may be obtained . . . General.

*SORE EYES. Jet Series. Produced by the Christian Medical Association, India. Black and white. 22 frames. No captions. Printed commentary. Published price A.16s.9d.
Subject: Reasons for eye trouble.
Medium: Drawings.
Technical Standard: Good.
Comment: The little stick figures in this filmstrip tell their story with great verve and dash. They are extremely graphic and amusing as well as being a good means of instruction. Somra has a sore leg; he touches it with his hand and then rubs his eyes—next day he has sore eyes. His little brother uses Somra's infected towel and in no time he has the same complaint. Mother takes them to a medicine man, who does them no good, but who, incidentally, is a superb stick figure with beard, turban and spectacles. Then Auntie, who is a nurse, comes and shows them how to deal with the situation and how to prevent such things happening again. The end of the strip mentions such other causes of trouble as smallpox, trachoma and vitamin deficiency, and finishes with instructions for treatment of bad eyes. Cards for class use are included with the filmstrip. . . . . General.

Flannelgraphs

*ANATOMY. Produced by Central Council for Health Education, London. For further details apply.
This flannelgraph comes in three sections—a black background on which full view and side view outlines of the human body are marked in white; a white background (for cutting out), with the bones of the skeleton and a number of different coloured pieces of felt on which the internal organs are drawn. The white paper carrying the bones is backed with a material designed to stick to the black cloth that carries the outlines, and the coloured organs, being drawn on felt, will also adhere to the main figure. All three sections give both front and side views.

A flannelgraph like this should prove extremely useful for instruction of nurses or even for village education.

*FLANNELGRAPH SERIES 1-5. Produced by the Central Council for Health Education, London.
The flannelgraphs in this series come in the form of black and white line drawings, which are to be coloured, cut out and mounted by the user. Directions for use and a text for the lesson are provided with each.

1. *The Vicious Circle.* Price stg.3s.6d.
The circle of infection is the subject of this flannelgraph—a food handler has a cold, the food becomes infected and transmits germs, and so on. In the last section of the circle the audience is asked

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to choose between a cross, meaning death, and a happy face, meaning health, the choice being in the hands of each one of us.

2. *The Birth of a Baby.* Price stg.5s.6d.

The black and white drawings are accompanied by an excellent little illustrated booklet clearly showing the birth process. The enlarged flannelgraph drawings are clear enough, but as this is a subject almost entirely dependant on movement, the static nature of flannelgraphs is not entirely adequate. However, the component parts are useful illustrations to a lecture.

3. *Nutrition and Food Hygiene.* Price stg.5s.6d.

The component parts are so designed that the lesson may be made a very simple one for young children or more complicated for adults. It deals with methods of storage, and as a refrigerator appears as the key point of the discussion, the flannelgraph, as it stands, would not be practical for general village use. On the other hand, it could be used as a model for local versions.

4. *Personal Hygiene.* Price stg.3s.6d.

The parts of this flannelgraph are accompanied by three headings: Essential, Helpful, and Unnecessary, and it is suggested that the audience be invited to group the parts on the board under whichever headings they think they should go. The cut-outs range from water to nail varnish and hair cream, so there is plenty of room for discussion and the defence of the individual preferences.

5. *Chains of Infection.* Price stg.3s.6d.

The chain is built up of links, each of which show a way in which the disease can be transmitted—in this case poliomyelitis—but by making a few changes the flannelgraph could be used to demonstrate any other disease, since the main means of infection are usually the same.

Mother and Infant Nutrition

(Continued from page 9)

the women's committees. Nutrition is a very local, sometimes individual, problem, and the experts should be in direct contact with the level of the problems.

If dietitians are needed for supervising the slighter nutrition problems of prosperous, well-developed communities, and nobody disagrees with that, why should they be absent in the Pacific regions, where so many problems exist, caused by plain malnutrition or by un-co-ordinated acculturation and by a vulnerable economy?

The dietitian is the type of expert who can supervise institutional kitchens, teach nutrition in nursing and home economics programmes, guide the dietary activities of women's committees, co-operate with public and health authorities, etc. Perhaps she could also do something to preserve or develop the taste for native foods which is rapidly waning and often not displaced by a better "cuisine"! Without lacking respect for skilled cooks or hospital cooks, it should be emphasized here that a dietitian is something more, and that it is a responsible and specifically feminine profession.

To achieve ends there should be means. The introduction of imported food, even of such essential items as cow's-milk, still occurs in a rather haphazard fashion.

Why does the Tahitian have a popular song praising the virtues of imported corned beef while silence and indifference is maintained on the riches of his reefs? Why is conserved milk nearly always identical with the condensed sweetened variety, while dry buttermilk preparations would be far safer in unskilled hands? Why does the Indian labourer from Fiji import his useful grams and dhals from India, instead of growing them himself in Fijian soil and demonstrating their value to the pulse-poor Pacific?

Pigs and cows require slaughtering and organized distribution. Fish is usually of the right size for the household, and can be raised quite simply in the neighbourhood of the homes in fish ponds. These can produce in the meantime a very useful and palatable vegetable, 'kangkung', which also is a neglected item in many regions. Something suitable can be found to improve the diet of the primitive sago eaters; recently "Job's tears" has been mentioned, a common weed in the Pacific, apparently only known to horses.

There are still many possibilities, endogenous or exogenous, which could improve and protect the popular diet in the Pacific. These are rather indirect mother and child problems; nevertheless they might need improvements most.

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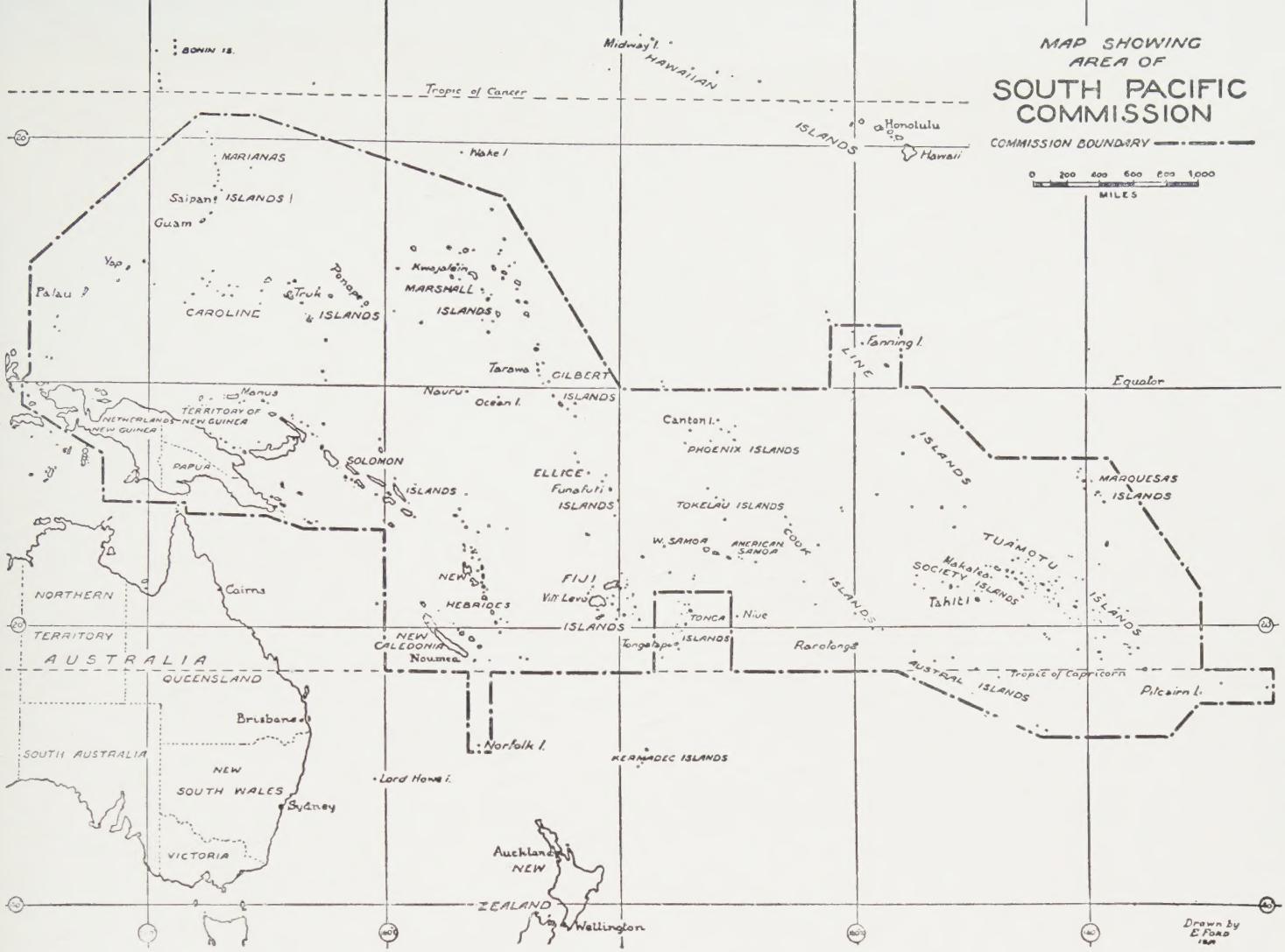

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